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DISCUSSION PAPER NO. 225

Entry and Exit to the Canadian Manufacturing Sector: 1970-1979

by J. Baldwin and P. Gorecki
with J. McVey and J. Crysdale

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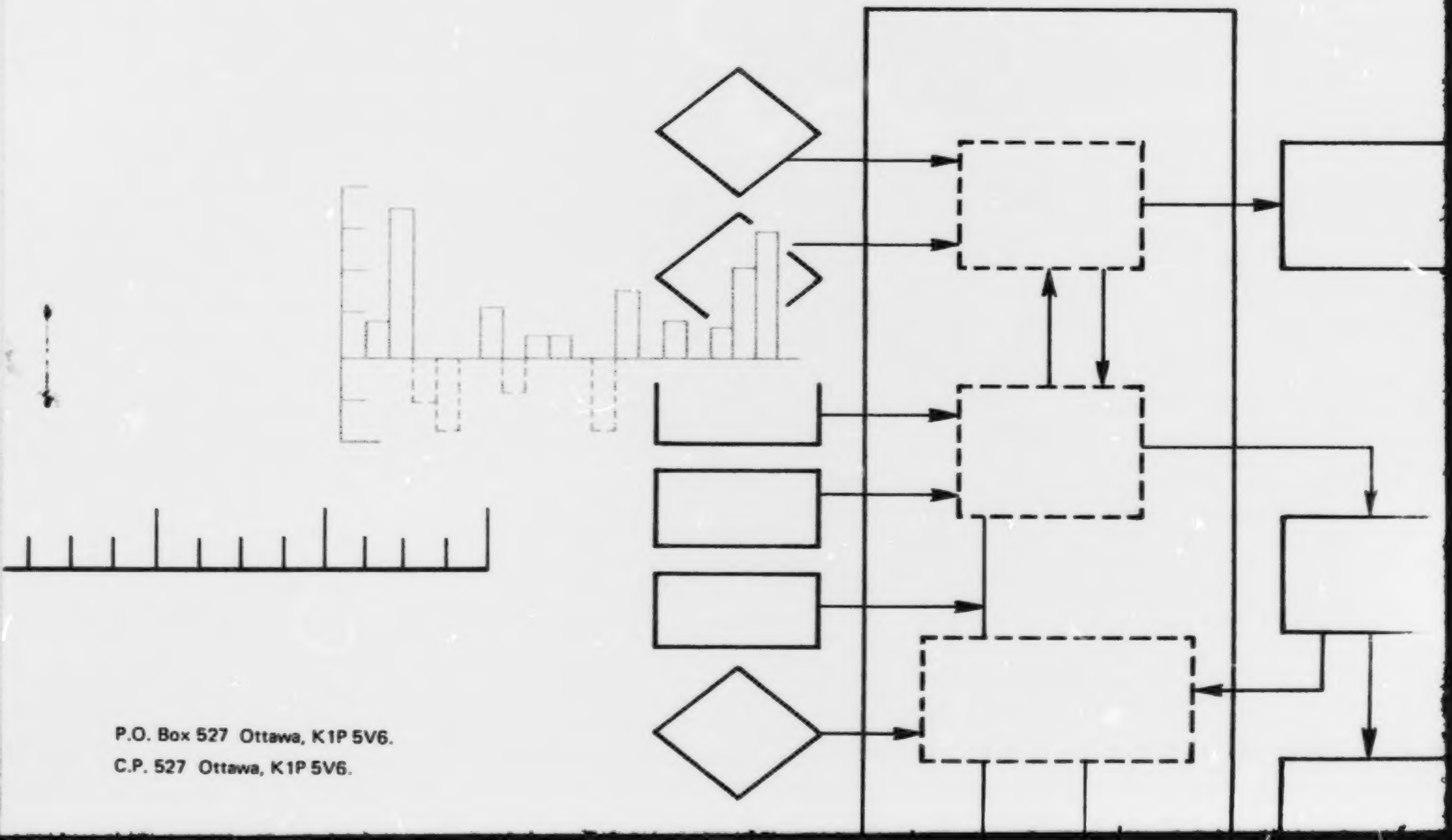

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RÉSUMÉ

Depuis dix ou quinze ans, le volume des échanges du secteur manufacturier canadien a considérablement augmenté, tandis que le degré de sa protection tarifaire a beaucoup diminué. En pourcentage de la production nationale, les exportations sont passées de 23,3 % en 1970 à 28 % en 1979, alors que les importations, en proportion du marché canadien, sont passées de 21,7 à 27,2 % au cours de la même période. Les tarifs douaniers ont diminué d'environ 30 % entre 1966 et 1978. L'adaptation des entreprises à de tels changements -- surtout dans le contexte actuel marqué d'une recrudescence des sentiments protectionnistes et de la crainte du chômage suscité par la concurrence des produits importés -- devient alors une importante question d'intérêt public. L'auteur se fonde, dans son étude, sur une base de données spécialement mise au point à Statistique Canada pour permettre d'examiner un aspect particulièrement significatif de l'adaptation des entreprises, c'est-à-dire leur façon d'entrer dans leurs industries respectives, ou d'en sortir, au cours de la décennie 1970-1979.

Les entrées et les sorties d'entreprises ont été significatives au niveau de l'industrie. En 1979, 14 % des ventes d'une industrie, en moyenne, ont été effectuées par des entreprises qui avaient accédé à cette industrie en

construisant des usines au cours des années 1970 à 1979, tandis que 16,2 % de la moyenne des ventes en 1970 ont été attribuables à des entreprises qui ont quitté l'industrie entre 1970 et 1979 en abandonnant leurs usines. Par conséquent, dans l'ensemble, les entrées et sorties d'entreprises du secteur manufacturier se sont compensées, ce qui indique peut-être que leur adaptation a été relativement peu pénible.

Les moyennes établies pour le secteur de la fabrication peuvent, néanmoins, dissimuler d'importantes différences dans l'adaptation des entreprises. Dans les industries en déclin, notamment, l'adaptation peut signifier le départ d'entreprises et, par conséquent, la désaffectation de beaucoup d'usines -- processus d'adaptation particulièrement pénible -- tandis que dans les industries de croissance, le principal mécanisme peut être l'arrivée de nouvelles entreprises créant divers établissements. Mais, dans la réalité, les choses ne se passent pas ainsi. Nous savons que, dans les industries à croissance lente, modérée ou rapide, le principal facteur d'adaptation a été, de 1970 à 1979, la variation des arrivées de nouvelles entreprises, accompagnée d'un taux d'abandon assez constant. Dans le cas des industries en déclin, le nombre de départs à dépassé de beaucoup celui des arrivées, quoique celles-ci aient quand même été fort nombreuses.

L'auteur a utilisé des techniques économétriques pour estimer les déterminants des entrées par la construction de nouvelles usines et ceux des sorties par la désaffectation d'installations existantes. Dans les deux cas, un facteur important (en fait, le seul pour les sorties) a été le nombre d'entreprises en 1970. Les arrivées et les départs reflètent un processus de remplacement naturel; des entreprises cessent d'exister et de nouvelles font leur apparition. Ce résultat, dans le cas des sorties, concorde avec la constatation que les taux de sortie ont été passablement constant parmi les industries de croissance.

Pour ce qui est du commerce, nous remarquons que les entrées et sorties d'entreprises canadiennes varient fortement en fonction du volume croissant des importations et des exportations au cours de la décennie 1970-1979. Par contre, même si les arrivées et départs d'entreprises étrangères varient aussi dans le même sens que les entreprises canadiennes, leurs fluctuations sont en général très faibles. Des exportations plus élevées concourrent à une réduction des sorties et suscitent plus d'entrées d'entreprises dans l'industrie. D'autre part, la croissance des importations n'a aucun effet sur les entrées, bien qu'elle réduise les sorties. Ce résultat est peut-être attribuable au fait que, dans les industries qui importent beaucoup, ce sont les petites entreprises qui fabriquent des produits différents des importations, ou qui ne font en réalité que de l'emballage, qui survivent.

Les entreprises canadiennes ont fort bien réagi aux possibilités que leur offrait la croissance du commerce international. Par contre, les arrivées et départs d'entreprises étrangères sont beaucoup moins en rapport avec ces possibilités de croissance. C'est donc dire que l'adaptation des industries à l'augmentation des échanges commerciaux, par l'entrée et la sortie d'entreprises, s'est faite avant tout par les entreprises canadiennes. Autrement dit, dans l'industrie manufacturière, ce sont elles qui ont répondu aux possibilités accrues de commerce découlant du processus actuel de révision des tarifs et qui, par conséquent, ont été l'objet d'une rationalisation de nature à favoriser la position concurrentielle de ce secteur.

ABSTRACT

Canada's manufacturing sector has experienced substantial increases in trade flows and decreases in rates of tariff protection over the last 10 to 15 years. Exports, as a percentage of domestic production, have risen from 23.3 per cent in 1970 to 28.0 in 1979, while imports as a percentage of the Canadian market have risen 21.7 to 27.2 over the same period. Tariffs have fallen by approximately 30 per cent between 1966 and 1978. An important public policy issue, particularly in the current environment of rising protectionist sentiments and fears of unemployment because of import competition, is the way in which firms adapt to such changes. This paper uses a specially created database at Statistics Canada to examine one particularly significant facet of firm adaptation: the process by which firms enter or exit industries over the decade 1970 to 1979.

Firm entry and exit were significant at the industry level. On average, 14.0 per cent of an industry's sales in 1979 were accounted for by firms which entered an industry by the building of plants during the decade 1970-79, while 16.2 per cent of the average industry's sales in 1970 were accounted for by firms that left the industry by scrapping plants between 1970 and 1979. Hence, on average, in the Canadian manufacturing sector, firm entry and exit balanced one another off, which might suggest a relatively painless adjustment process.

Averages across the manufacturing sector may, however, mask important differences in firm adaptation. In particular, in declining industries adaptation might be firm exit via high rates of scrapping of plants -- a particularly painful adjustment process -- while in growing industries new firms creating establishments might be the main mechanism. As it happens, the facts do not conform to this view. In slow, moderate and fast growing industries over the decade 1970-79 the main adjustment mechanism was variations in births, with a fairly constant death rate. For declining industries, the number of deaths substantially exceeded births, but births, nevertheless were considerable.

Econometric techniques were used to estimate the determinants of entry by building new plants and exit via scrapping of plant. On both the exit and entry side an important determinant (on the exit side the determinant) was the number of firms in 1970: entry and exit reflect a natural replacement process as existing firms die and new firms enter. This result for exit is consistent with the finding that exit rates were fairly constant across industry growth categories.

Moving to the trade variables we find the Canadian firm entry and exit reacts strongly to the increasing volume of imports and exports over the decade 1970 to 1979. In contrast, although the reaction of foreign firm entry and exit to these forces is in the same direction as Canadian firms, it is usually quite weak. Higher exports result in less exit and more entry. On the other hand, increasing imports had no impact on entry, but reduced exit. This latter result may reflect the fact that in import-intensive industries, small firms with differentiated products or small firms that are essentially packaging operations are those that survive.

Canadian firms responded significantly to opportunities provided by growth in international trade. In contrast, foreign entry and exit bear much less relationship to these growth opportunities. Thus adaptation via firm exit and entry to increased trade flows was borne primarily by the domestic sector. Put differently, it was the domestic sector in manufacturing which responded to increased opportunities for trade provided by the ongoing process of tariff revisions, and hence underwent a rationalization process that should have bolstered its competitive position.

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PREFACE

Few studies of the turnover process exist. While there are only a handful dealing with entry, there are even less that examine exit. Yet, the turnover process is critical to an evaluation of the performance of an industry. This study attempts to add to our knowledge in this area by examining the entry and exit process to Canadian manufacturing industry in the 1970s.

Its contribution is not just that it adds to the small number of studies in this area. This study takes a more comprehensive view of the turnover process than has been done before. Most studies look only at part of the process -- either by grouping entry and exit together to obtain net change, or by investigating only entry or exit. In this study, data on both entry and exit are collected and separately explained. In addition, this study recognizes that entry and exit can occur in more than one way. For example, entry can occur either by a new firm creating new plant or acquiring existing plant. This study examines each of these alternatives for entry and their counterparts for exit separately. It also compares the plant creation (scrapping) process for new firms to the same process for existing firms. Finally, it considers whether the acquisition process that introduces outsiders to the industry differs from the internal acquisition -- whether the determinants of conglomerate and horizontal mergers differ.

While entry and exit provides the main theme for this study, there were two other objectives. Canadian industry, to use current terminology, operates in an open not a closed economy. Trade substantially affects its well-being. Since the significance of both imports and exports has increased during the 1970s, the manner in which entry and exit responded to these changes is examined. This required a departure from the standard approach taken by others who have modelled the entry process in closed economies. This study examines whether the entry (exit) response differs depending upon whether growth comes from domestic as opposed to foreign sales.

The second subtheme that is examined herein is the extent to which domestic and foreign controlled firms differed in their entry and exit response. Not only is the Canadian economy open in the sense of being exposed to international trade, but almost half of each manufacturing industry's output is accounted for by foreign controlled firms. This substantially complicates any entry and exit study since suggestions abound that the two types of firms do not respond in the same way to domestic variables. Therefore this study broke its entry data into two groups -- one for domestic and one foreign -- to allow for different responses on each group.

This ambitious range of topics has led to a rather lengthy monograph. The ambitious reader will want to proceed to the rest of the study to satisfy himself that the conclusions that have been drawn are correct. However, for those that are less patient, the methodology and the results are summarized below.

A] Categories Examined:

As indicated, the entry and exit process was divided into a number of categories -- each of which was examined separately. These categories are

Entrants	N22	the number of firms that entered the industry by acquiring one or more plants between 1970 and 1979.
	N23	the number of firms that entered the industry by building one or more plants between 1970 and 1979.
Exits	N31	the number of firms that left the industry by divesting one or more plants between 1970 and 1979.
	N34	the number of firms that left the industry by scrapping one or more plants between 1970 and 1979.
Continuing	N11	the number of continuing firms that divested themselves of one or more plants between 1970 and 1979.
	N12	the number of continuing firms that acquired one or more plants between 1970 and 1979.
	N13	the number of continuing firms that built one or more plants in the same industry between 1970 and 1979.
	N14	the number of continuing firms that scrapped one or more plants between 1970 and 1979.
	N15	the number of continuing firms that owned at least one plant that existed in both 1970 and 1979.

B] The Model Used:

The model is based on the presumption that while the profitability of an industry is a determinant of the entry and exit process, it is not the only important cause. In particular, the entry is regarded not just as a supply augmenting phenomenon but also as a replacement process. As a result, entry (exit) are also related to growth (appropriately deflated for differing sized plants) and number of firms. The coefficients on the latter two variables are allowed to vary depending upon the ease of entry or exit as measured by advertising and R & D intensity. The independent variables can be grouped into

i) those that relate to growth (export, import, and doemstic sales)

ii) those that relate to profitability (rate of return and various entry barriers)

iii) those that reflect the replacement process (number of firms, interaction terms with advertising and degree of research and development spending)

iv) other variables (such as regionality of the industry, its initial exposure to trade, the degree of foreign ownership).

These variables are used to explain both the numbers of entrants and exits in each category as well as their respective share of sales. The latter turned out to be less amenable to explanation. Share in any category is the product of the ratio of numbers in any entry (exit) category to total firms multiplied by the ratio of size of entrants (exits) in that category to average size in the industry. While entry, defined as relative numbers, can be explained by the variables being used here, relative size of the entrant cannot. Finally, the ratio of numbers of entering or exiting firms to continuing firms in the same category (for instance, those that build plant) is used as a dependent variable to test for the influences that cause insiders as opposed to outsiders to react differently.

C] The Results:

The findings of this study provide a wealth of detail on each of the three main themes. Only the highlights in each area will be summarized.

1) The Entry and Exit Process

a) An examination of the entry and exit data reveals

i) Entry and exit, whether measured in terms of numbers or shipments, was significant. As of 1979, over 25 per cent of sales on average originated in firms new to the industry; 30 per cent of sales in 1970 were in firms that exited. These figures do not show that entry was completely blockaded; but they also indicate that the process of complete turnover may have a relatively long gestation period.

ii) In terms of numbers, entry and exit were dominated by new firm plant creation or exiting firm plant scrappings; in terms of sales these categories were almost equally split between plant openings and plant acquisitions, or between plant scrappings and plant divestiture. This suggests that models of entry that miss the acquisition process COMMIT a serious error of omission.

iii) Whether measured in terms of proportion of firms or share of sales, exit rates are greater than entry rates on average. This increases the importance of attempting to model the two processes separately.

iv) The new firm entry and departing firm exit categories were much more important than the same categories for continuing firms - whether measured in terms of numbers of firms or share of sales. Of particular interest is the difference between mergers that resulted in entry, accounting on average for 12.3 per cent of sales as of 1979, and horizontal mergers, accounting for only 3.2 per cent of sales as of 1979. The traditional emphasis in competition policy has focused on horizontal mergers. The diversification merger process warrants greater attention than it has received.

v) The size of new plants created by new firms averaged sixty per cent of that of new plants created by continuing firms. The size of plants scrapped by exiting plants was some seventy per cent of the size of plants scrapped by exiting firms. However, in both cases, these ratios were not significantly different from one. Thus entry and exit cannot be described as occurring in a miniscule fringe group.

vi) The entry and exit process of plant births and scrappings was relatively more important for domestic than foreign firms. In 1970, 55.1 per cent of sales on average were made by domestic firms but 74.6 per cent of the sales by firms that exited were in domestic firms. In 1979, 57.5 per cent of sales on average were made by domestic firms; but 71.4 per cent of the share of entrants that had created plant was in domestic firms.

vii) While the entry rate (entrants divided by number of firms) monotonically increased across four groupings of industries (negative, slow, medium and fast growth), exits did not. This suggests the entry and exit process did not respond in the same way to incentive variables.

b) Several different conclusions about the existence of entry and exit barriers emerge from the study.

i) In the regressions reported herein, the two traditional entry barrier variables -- plant scale and concentration -- are both negatively related to domestic new plant new firm entry (N23C) but not significantly. Both are positively related to the same foreign entry variable (N23F) but again not significantly. Thus when size effects are entered using number of firms, entry barriers have no differential affect in the domestic and foreign populations. Alternate formulations that corrected for size of industry using sales deflated by minimum efficient scale of plant and foreign ownership to correct for overall influences that determined foreign investment found both domestic and foreign entry negatively affected by these entry barriers. In conclusion, the case for a differential effect of entry barriers between domestic and foreign entrants (N23) is weak.

ii) For both foreign and domestic exiting firms that scrap plant, the plant scale and concentration variables have a negative effect. At first glance, this tends to suppoort the contention that exit barriers exist. However, a comparison of the relative size of the coefficients on these variables in the entry and exit equations reveals their net effect on number of firms is neutral for domestic firms and positive for foreign. The underlying dynamics of the turnover process is, therefore, leading to more not less firms in concentrated industries.

iii) In contrast to the scale entry barrier variables, advertising and R & D are generally highly significant.

   I) Advertising has a significant negative influence on entry and exit by plant birth or scrappings for both new domestic and foreign firms (N23, N34). However, the effect of advertising on exit is greater than on entry, a situation that ultimately leads to an increase in the number of firms.

   II) R & D has the opposite effect. It leads to less entry and more exit in both domestic and foreign categories (N23, N34) thereby contributing to greater concentration.

   III) In the continuing plant categories, both advertising and R & D lead to either less plant opening and/or more plant closing. Ceteris paribus, this would contribute to larger average plant size.

c) Separate estimation of the various entry and exit processes permits the following conclusions about similarities and differences between various of the entry and exit categories.

i) The plant creation process for new domestic as opposed to continuing domestic firms is very similar. The main difference is that while barriers negatively influence entry by new firms creating plant, they have the opposite effect on continuing firms. Thus the entry relationship (N23) describes not so much entry per se as plant creation and shows that insiders and outsiders respond basically to the same forces though in differing degrees depending upon the barriers variables.

ii) For domestic firms, the merger process by outsiders and insiders is quite similar though there are differences. Horizontal mergers are concentrated more in regional industries. They are less related to concentration. Finally domestic horizontal mergers are greater where there is less growth and larger increases in minimum efficient scale of plant thereby suggesting rationalization as a basic motive for such mergers. In contrast, the two merger processes for foreign firms bear little resemblance.

iii) The two processes used by domestic new firms to enter an industry -- via the creation of new plant as opposed to the acquisition of new plant -- are quite dissimilar. The domestic merger process, in contrast to the domestic new firm new plant creation process, is positively related to concentration and not affected by advertising. Thus, in concentrated industries, new identities are created more via the diversification merger process and not via the plant creation process. Domestic mergers by outsiders are significantly related to profitability whereas plant creation is not. Moreover, diversification mergers are not related to domestic sales growth but new plant creation is. One view of the diversification process is that it essentially is a reallocation of resources from one industry to another. The results here suggest the reallocation is essentially in response to differential profit rates than differences in growth.

iv) The two domestic continuing firm categories -- new plant creation and horizontal mergers -- also differ substantially. In particular, horizontal mergers are negatively related to domestic sales growth whereas continuing firm are positively related to the same variable. Concentration has a stronger positive effect on new plant creation than on mergers. Mergers are concentrated on regional industries but new plant creation is not. Finally, mergers are positively affected by advertising but new plant creation is not.

v) The two plant scrapping processes differ substantially. While scale barriers to exit may exist at the firm level, they do not have the same negative effect on plant scrapping by continuing firms. On the other hand, the perverse effect of negative rates of growth leading to less not more scrapping is more significant for domestic continuing firms than for exiting firms.

vi) The entry and exit processes are sufficiently different than estimation of only a net entry relationship would miss important differences between the two. It would fail to catch the different rates of replacement of foreign as opposed to domestic firms. It would fail to distinguish between the replacement and the rationalization process. It would fail to catch the perverse effect of negative growth on the exit process. It would fail to catch the different effect of the barrier variables.

vii) A comparison of the entry and exit process shows that the replacement leading to entry is much smaller than the rationalization process leading to exit. Entry then will exceed exit only where other variables which have a positive effect on entry or a negative effect on exit are important. Thus an industry that has matured and is no longer expanding rapidly will have a tendency to become more highly concentrated.

2. Differences Between Foreign and Domestic Firms

a) Generally, the number of Canadian firms in every entry category responded to both the number of existing domestic (NC) and also to foreign firms (NF). Foreign firms responded only to the existence of foreign firms (NF). This confirms the existence of a dual economy. However, it should be noted that the response of Canadian firms to NF was generally substantially larger than to NC. This suggests there was movement by Canadian firms into the foreign sector.

b) In the equation explaining exit by firms scrapping plant (N34), the coefficient on existing number of firms is larger for domestic firms than foreign firms. The opposite is true in the equation explaining scrapping of plant by continuing firms (N14). In this sense, foriegn firms exited at a lower rate but scrapped plant at a greater rate. This suggests the foreign firm was more capable of adapting to adverse circumstances without completely disappearing.

c) Domestic and foreign continuing firms respond similarly to incentive variables in a number of ways. First, they generally respond in the same way to the profit variable that is most significant. And in the continuing firm category (N13, N12), they respond similarly to export growth opportunities. The major difference in the continuing firm category is that domestic firms respond significantly to domestic growth and changes in the average scale of large plant while foreign firms do not.

In the new firm category, domestic and foreign firms exhibit greater differences. Domestic acquisitions respond to profitability but foreign acquisitions do not. In both categories, domestic firms respond positively to export growth but foreign firms do not. Finally new domestic firms creating plant respond positively to domestic sales growth but foreign firms do not.

In conclusion, entering foreign firms do not respond to the same incentive variables as domestic firms but are more likely to once they are established.

3. Response of Entry and Exit to Growth Opportunities

a) Only new or exiting domestic firms that did so by creating or scrapping plant (N23C, N34C) react significantly to growth with the expected signs. Export and domestic sales growth leads to more entry and less exit. Foreign firms in the same category (N23F, N34F) generally did not respond to growth with the same significance though the signs of the coefficients were the same as for domestic firms. Adaptation to growth, whether it be from export sales or domestic sales, is primarily a domestic phenomenon.

b) The effect of imports in all four exit equations that involve the scrapping of plant (N34C, N34F, N14C, N14F) is perversely negative and often significant. This is the result of a non-linear effect of growth on the exit process. Positive growth leads to less exits; however for negative growth industries, the larger is the decline in sales, the less exit takes place. This effect occurs for all exit categories but is particulary strong for continuing domestic firms that scrap plant (N14C). Thus those industries which were most in need of adaptation because of declining demand appeared to be least able to adapt.

c) The effects of trade liberalization can be estimated by comparing the size of the coefficients attached to export and domestic sales growth -- assuming that an increase in exports is offset by a decline in domestic sales due to imports. For domestic firms that enter or exit by creating or scrapping plant (N23C, N34C), the effect of balanced trade growth would be to decrease the number of firms thereby leading to an increase in average size. This is not the case if the perverse effect of negative growth, proxied by the perverse sign on imports, is also considered. In this case, the effect of trade liberalization has actually been to increase the number of firms, which necessarily implies the increases in average plant size that could have accompanied this process were not exploited to the full.

d) An analysis of balanced trade effects on foreign entry and exit does not yield the same effects. A comparison of the coefficients, even though they are insignificant, indicates that the export response is greater than the response to domestic sales. This can either be attributed to a greater tendency for foreign firms to respond to exports or the fact that they are generally larger in size than domestic firms and trade growth offers less of an opportunity to move towards plant sizes that more fully exploit economies of scale.

e) An analysis of the effect of a balanced increase in trade for continuing firms is complicated by the perverse effect of negative growth on exits. Looking only at entry, however, both domestic and foreign firms respond more to exports than to domestic sales growth. It may be that exports offer the opportunity for plant specialization not presently the case for plants oriented toward the domestic market where a large number of product lines are grouped in one plant.

f) The growth variable in this study was broken into two components. The first measured the extent to which new room was created when markets expanded. The second measured the extent to which less room was available because the proxy for minimum efficient scale was increasing. For almost all categories, both domestic and foreign entry responded in a way that facilitated increases in average plant size. Of interest is the fact that foreign entry and exit was more significantly related to the rationalization variable than it was to the expansion of total sales. Thus, while foreign firms may not have been taking advantage of rationalization opportunities available from trade, they were certainly responding the general increases in plant size that took place during the 1970s.

INTRODUCTION

It is ironic that the entry and exit process has received relatively little attention from industrial economists. Compared to the large number of cross-sectional studies linking structure and performance, there are relatively few studies of the determination of entry and exit. Yet, without a thorough examination of the extent and determinants of firm turnover, the reasons for changing industry performance cannot be fully evaluated. Static structure-performance models have almost completely ignored the underlying dynamics of the way in which markets adapt to changed circumstances. Without an understanding of the adaptive process, policy in the area of competition law, especially merger policy, must be made in a partial vacuum.

Understanding the adaptation process is equally important if the effects of trade liberalization are to be fully appreciated. All too often, recommendations for trade liberalization are made without a full delineation of the transition process that can be expected. Several questions as to the type of adaptation process that can be expected need to be answered if the costs of transition are to be better understood.

The first is the extent and the manner in which firms operating in Canada have responded to changes in the economic environment that have resulted from past changes in trade policy and other exogenous events. While particular studies have dealt with specific industries, general cross-sectional studies that evaluate the factors governing the adaptive process have been missing. This is particularly serious in light of the importance often attributed to such variables as market structure in the debate over the causes of the relative efficiency of Canadian versus U.S. industries. Imperfect competition models such as those used by Eastman-Stykolt [1967] suggest that substantial benefits could be garnered by a reallocation of resources within sectors that presently operate inefficiently because of the miniature replica phenomenon. Changing the rate of tariff protection behind which the miniature replica economy functions has been suggested as one possible action available to remedy the situation. However, it has also been hypothesized that an imperfect oligopolistic market may substantially delay implementation of the full benefits that a reduction in tariffs is meant to achieve. (Scitovsky, [1958]). Equally important, the disinvestment process that is so critical to reallocating resources is also subject to uncertainty in the presence of imperfect oligopolistic markets. Barriers to exit found in market structure variables may be as important as barriers to entry in distorting the allocative process. Recent work (Caves and Porter, [1976]) suggest that market imperfections of the traditional variety may also be at work here.

It is, therefore, important to catalogue the factors that have influenced the extent and manner of adaptation of Canadian industry to past changes in tariff protection. Such a study should indicate whether improvements occurred in those industries where change was most required. Moreover, such a study should indicate whether government policy makers need only wield the general instrument of tariff reductions or whether, even in the face of tariff reductions, specific sectoral policies need to be devised to speed the rate of adaptation.

In addition, a study of the adaptive process and the variables that affect it promises to answer a second important issue. At the heart of arguments over the extent to which liberalization of trade restrictions will require inter-sectoral shifts in resources as compared to intra-sectoral shifts is the position taken on whether Canadian inefficiency is caused by imperfect market structure. An investigation that is able to discern whether, in the past, imperfect markets have adapted differently to changes in protection should provide an answer to the extremely sensitive political question as to whether trade liberalization will lead to the disappearance of an industry or only require its reorganization.

Another issue that has received little study in the debate over trade liberalization is the extent to which domestic and foreign firms have responded differently to past events. Several studies suggest that with regards to entry (Gorecki, [1976]) and the diversification process (Caves, et. al., [1980]; Gorecki, [1980]), domestic and foreign controlled firms do not respond identically to the same stimuli. Therefore a closer examination is warranted of the extent to which a dual economy is functioning in Canada. It will help to delineate the source of the differences, if they exist, that may have caused the two sectors to diverge. It will also help to answer whether the very existence of more rather than less of one type of firm affects not just the distribution of industries across countries but also the levels of production (See Caves, [1980B] for a test of this proposition). Finally, it will help to determine whether increased efficiency that trade liberalization promises must necessarily be accompanied by increased levels of foreign control. A negative finding on the functioning of a dual economy will answer the critics who insist trade liberalization will lead to increased foreign domination. A positive finding will at least help to delineate the reason for the problem [greater response to export growth, superior exploitation of economies of scale] and provide a guide for policy intervention should the latter be judged desirable.

This paper is the first in a series that will attempt to answer some of these questions. It examines the entry and exit process to the Canadian manufacturing sector during the 1970s. During this decade, the Canadian manufacturing sector was faced with adapting to changes in the degree of protection it faced. On the one hand, tariffs, which had begun to fall with the Kennedy Round of Gatt tariff changes in 1960, continued to decrease. For example, in the food and beverage classification, average tariffs paid, which were 21.1 per cent in 1966, fell to 11.2 per cent in 1975. Not all industries experienced such precipitous declines; nevertheless, the average tariff for all manufacturing industries, which was 11.9 per cent in 1966, did fall to some 8.8 per cent by 1975. Indicative of the gradual liberalization of trade was the fact that the percentage of total imports not subject to tariffs rose from 35.4 per cent in 1970 to 45.8 percent in 1979.

An equally important force that led to increased foreign competition for Canadian industry was the effect of the change in the exchange rate over the period. For example, an index of unit labour costs of Canada's major trading partners relative to Canadian labour costs stood at 100 in late 1970, had fallen to a low of about 87 in 1976, and then rebounded to about 112 by 1979. (Department of Finance [1980], p. 98).

In response to these forces, both Canadian exports and imports grew in importance in the manufacturing sector. Imports as a percentage of domestic disappearance rose on average from 21.7 per cent in 1970 to 27.2 per cent in 1979. Exports as a percentage of domestic production rose from 23.3 per cent in 1970 to 28.0 per cent in 1979. During the first half of the decade, as Canada's labour costs increased relative to its major trading partners, the ratio of imports to exports grew from 3.36 to 3.82. But this disadvantage was removed as the Canadian exchange rate declined in the latter half of the decade and by 1979, the ratio of imports to exports had fallen to 3.01.

This paper examines the extent to which the entry and exit of firms and establishments have responded to the changes in market size brought about by the increased exposure to trade. Building on earlier applied work in the industrial organization literature, it attempts to integrate the entry process into the established literature on structure, conduct and performance. It also divides entry and exit into that by foreign as opposed to domestically controlled firms so as to test for different adaptation responses.

THE MEASUREMENT OF ENTRY

Entry can be measured either by counting the difference in the number of firms (where a firm consists of a collection of production units under common control) or by focusing on the identity of the owners of these units. The two methods may not yield the same results. For instance, if entry is calculated by counting the difference in the number of firms in an industry, firms that entered by creating new plant or by buying part of the assets of existing firms would constitute a net addition to the industry. But firms that purchased the entire assets of existing firms would not be counted since the number of separate production entities would be unchanged. Concentrating on the number of firms can be justified if the total number of firms is taken to be the primary determinant of competition in an industry. Alternately, entry can be defined as the extent to which new owners of productive facilities become established - whether by creating new plant or by purchasing part or all of existing firms. This latter definition measures both the extent to which new production units are created and the degree to which the identity of the participants changes. The latter may have as important consequences for the state of competition in an industry as the former. Unfortunately, both of these definitions cannot distinguish between entry that occurs as the result of plant creation as opposed to entry via acquisition. Therefore empirical studies that do not distinguish between the two processes may miss important differences in them.

Existing empirical studies also suffer from a general inability to distinguish between entry measured on a gross as compared to a net basis. Gross entry measures the number of new firms. Net entry measures the difference between total entry and exit. Net entry figures ignore differences in turnover across industries. The same low net entry figure could be generated by low entry and exit or by large numbers of entrants offset by numerous exits. Using net entry ignores the possibility that entry and exit may not respond to the same forces in the same way.

Previous studies of the entry and exit process have rarely attempted to divide the entry and exit process into its various components. Most have used only a measure of net entry - the difference between number of firms in two different periods (Mansfield [1962], McGuckin [1972], Orr [1974], Duetsch [1975]). These studies therefore deal only with the joint effects of both entry and exit.[1] Peltzman [1965], and Orr [1974] attempted to develop data on gross entry. But their work is restricted to one industry-banking. The only study that apparently considers gross entry is one by Masson and Shaanan [1982] but it is unclear whether their definition covers entry by both plant creation and acquisition. Moreover their entry statistic is culled from trade sources rather than from comprehensive census statistics and is therefore subject to measurement error.

An additional shortcoming in most studies is that little attention has been given to the determinants of entry when accomplished via acquisition of existing firms. Mansfield [1962] only considers a change in ownership when estimating exit rates from an industry. Gorecki [1975] is an exception to this rule in that he distinguishes between new and "diversifying" enterprises in analyzing the determinants of entry. But even he is unable to distinguish between net and gross rates and, therefore, he must implicitly treat entry and exit as responding to the same influences.

In order to avoid the potential problems associated with previous approaches, this study breaks entry and exit into two components -- the number of new firms that established themselves by creating new plant and the number of new firms that entered by acquiring existing plant. Similarly, the number of firms that exited by scrapping plant and the number of firms that exited by divesting themselves of plant are each measured. In each case gross entry is calculated -- as well as gross exit in the corresponding exit categories. In addition, the number of continuing firms (those in existence in both 1970 and 1979) that acquired, or created plants is calculated. These data on continuing firms allow determination of whether the forces that lead to investment in new plants are the same, irrespective of whether the investor is a new firm or an existing firm. They also allow comparison of a merger process that is horizontal as opposed to one that is essentially part of a diversification process. Finally, the data on entry and exit are divided into foreign controlled firms and domestic controlled firms in order to test for different responses between these two subsets.[2]

The entry and exit data could be collected because, since 1970, all establishments in the Canadian Census of Manufacturers, have been assigned identification numbers that remain with the plant, as long as it remains in these censuses, regardless of changes in plant name, ownership, industry or location. In addition, enterprise identification numbers (which include a country of control designation[3]) have been assigned each year to commonly controlled establishments. As a result it was possible to identify new plants (births), plants leaving the censuses (deaths)[4] and plants acquired and divested by firms over time. Similarily it was possible to identify new and departing enterprises at the four-digit industry level as well as continuing enterprises. Aggregations of commonly-controlled establishments at the four-digit industry level are termed "unconsolidated" enterprises and for the purposes of this study will be referred to as enterprises or firms.[5]

With this identification scheme, the plants or establishments in Canadian four-digit SIC manufacturing industries between 1970 and 1979 were classified, on the one hand, as being divested, acquired, born, dead, or continuing and, on the other hand, as belonging to a firm that was in existence at both the beginning (1970) and end (1979) of the period (a continuing firm), only at the end of the period (a new firm), or only at the beginning of the period (a dead firm). The classification matrix used is depicted below along with the cell identification codes used subsequently to index variables. When a postscript C or F is attached to a cell identification code, the variable becomes the number of domestic controlled firms (C) or foreign controlled firms (F) in that category. For example, N23C refers to all new domestically controlled firms that entered the industry between 1970 and 1979 by building new plant.

TABLE 1

Classification Matrix

	FIRM STATUS		
Plant Status	Continuing	New	Dead
Divested	11	-	31
Acquired	12	22	-
Born	13	23	-
Dead	14	-	34
Continuing	15	-	-

The years 1970 and 1979 were chosen as end points for this study because it was the longest period for which the data on entry and exit were available. The year 1970 marked the beginning of a cyclical upturn in the Canadian economy, which peaked three years later in 1974. Subsequent retrenchment occurred until 1977 and this was followed by an expansion that lasted until 1979. Real after tax rates of return were quite similar in 1970 and 1979 (Department of Finance [1980], p. 93) suggesting the two years are reasonably comparable in terms of their position on the business cycle.

While the coverage of manufacturing firms provided by the data base and this classification scheme is more extensive than that previously used in Canada, it does miss a small number of plants. Those that are born after 1970 and die before the end of the period are omitted and only acquisitions of continuing establishments are included in the acquisition category.[6] Secondly, the data on plant turnover covers only those plants that were "large"[7] in either or both of the terminal years. Nonetheless, these plants account for the preponderance of industry sales -- some 98.5 per cent of sales in manufacturing in 1970.

This classification permits calculation of either the number of plants or the number of firms in each category. Since this paper is concerned with entry and exit at the firm level, the firm classification will be used. To estimate the entry and exit relationships the following variables were calculated for all firms, for domestically controlled firms, and for foreign controlled firms.

TABLE 1

ENTRY AND EXIT CATEGORIES USED IN THE STUDY

Entrants	N22	the number of firms that entered the industry by acquiring one or more plants between 1970 and 1979.
	N23	the number of firms that entered the industry by building one or more plants between 1970 and 1979.
Exits	N31	the number of firms that left the industry by divesting one or more plants between 1970 and 1979.
	N34	the number of firms that left the industry by scrapping one or more plants between 1970 and 1979.
Continuing	N11	the number of continuing firms that divested themselves of one or more plants between 1970 and 1979.
	N12	the number of continuing firms that acquired one or more plants between 1970 and 1979.
	N13	the number of continuing firms that built one or more plants in the same industry between 1970 and 1979.
	N14	the number of continuing firms that scrapped one or more plants between 1970 and 1979.
	N15	the number of continuing firms that owned at least one plant that existed in both 1970 and 1979.

A cross-sectional study of entry and exit may not provide meaningful conclusions if there are a substantial number of zero observations in any one category for a large number of industries. This can be a particular problem where a fine division of entry and exit categories is made and may explain why previous studies in this area have been so aggregative. Fortunately this study does not suffer inordinately from this problem. Table 2 presents the percentage of the 141 4 digit industries used in this study for which there are non-zero observations in each of the categories being used. Over 98 per cent of all industries experienced entry by new firms or the exit of complete firms. Even when firms are divided into domestic and foreign controlled categories, the coverage is still above 90 per cent. Only when divestiture by all continuing firms is examined are thirty per cent or less of the industries represented. On the whole the new firm entry and the firm exit categories are extremely well represented; the continuing firm entry and exit categories have poorer coverage with the plant creation and scrapping categories having more observations than the continuing firm acquisition and divestiture categories.

An appreciation of the extent of entry and exit can be derived from Table 3 which contains the average number of firms and average number of establishments in each category. The averages are calculated over only those entries for which there were non-zero observations. It should be noted that the categories chosen for the different methods of entry and exit are not mutually exclusive. For example, a firm can enter an industry by building plant or by acquir-

TABLE 2

PERCENTAGE OF INDUSTRIES FOR WHICH THERE ARE NON ZERO OBSERVATIONS FOR THE VARIOUS ENTRY AND EXIT CATEGORIES

Firm Category	Entire Sample	Domestic Firms	Foreign Firms
All Entrants	98.6	95.0	90.0
1) Entry by Birth	94.3	92.9	70.9
2) Entry by Acquisition	88.6	70.9	73.0
All Exits	98.6	96.5	87.2
1) Exits by Divestiture	91.5	79.4	73.0
2) Exits by Scrapping	96.5	92.2	78.0
All Continuing Firms			
1) With Continuing Establishments	100.0	97.2	88.6
2) With Divestiture	31.9	17.0	20.6
3) With Acquisition	51.0	40.4	31.2
4) With Births	75.2	58.2	45.3
5) With Scrapping	72.3	53.9	49.6

ing it or by doing both. Table 3 indicates that the overlaps are relatively minor in the entry and exit categories since the total number of firms entering (exiting) by one or other method is almost the same as the total number of entrants (exits). The possible overlap of continuing firms that may have divested, acquired, created or scrapped plant is slightly greater though still small in percentage terms. For example, there were 50.3 continuing firms while the sum of the number of such firms in the five categories listed is 62.1.

Table 3 reveals several other facets of the entry and exit process. First, the firms that entered or exited by building or scrapping plant were mainly single establishment enterprises. However those new firms that entered by the acquisition process had on average 1.5 plants per firm while firms exiting by divesting had on average 1.3 plants per firm. The average continuing firm had 1.3 plants per firm. Secondly, in terms of numbers, exit was more important than entry. If the determinants of the exit and entry processes differ, simply calculating the difference between existing numbers of firms and calling it entry (or exit) for a regression analysis is inappropriate. In addition, entry via merger is not insignificant relative to entry by creation of plant. N22 is 23 per cent of N23. The same holds true for exit via divestiture as opposed to the scrapping of plant; N31 is 22 per cent of N34. Finally, entry and exit by continuing firms - in terms of number of firms that built or scrapped plant is much less significant than entry or exit by new or dying firms - at least when this process is measured by absolute numbers of firms.

Since the absolute value of the number of firms in each category does not fully capture the importance of the entry and exit

TABLE 3

AVERAGE NUMBER OF FIRMS AND ESTABLISHMENTS ACROSS 141[1] CANADIAN MANUFACTURING INDUSTRIES FOR VARIOUS CATEGORIES OF ENTRY AND EXIT: 1970 and 1979

Firm Category	Number of Firms		Number of Establishments	
	1970	1979	1970	1979
All Firms	88.1	74.6	105.3	93.3
All Entrants[2]		24.6		28.2
1) Entry by birth (N23)		21.7		22.7
2) Entry by Acquisition (N22)		4.9		7.3
All Exits[3]	38.3		42.3	
1) Exit by Divestiture (N31)	7.2		9.4	
2) Exit by Scrapping (N34)	33.2		34.4	
All Continuing Firms[4]	50.3	50.3	63.5	65.4
1) with Continuing Establishments (N15)	49.8	49.8	58.3	58.3
2) with Divestiture N(11)	1.6		2.5	
3) with Acquisition N(12)		3.1		5.5
4) with Births N(13)		3.9		5.7
5) with Scrapping N(14)	3.7		6.2	

Notes: 1) The sample corresponds to the 167 four digit s.i.c. industries for which data existed in both 1970 and 1979 less those industries classified as miscellaneous or 141 industries in total.

2) The number of firms that entered between 1970 and 1979 by births and/or acquisitions.

3) The number of firms that exited between 1970 and 1979 by divestiture and/or scrapping.

4) The number of firms that existed in both 1970 and 1979.

process, Table 4 is included to show the relative proportion of firms in each category and the relative proportion of their new, acquired, divested, and scrapped plants' sales in relation to the industry totals. These averages are reported both for all industries used in the analysis and for just those industries where non-zero observations occur. Table 4 shows that for the entire industry sample, in 1979 32.5 per cent of firms on average were new to the industry and accounted for 26.2 per cent of sales in that year. Although the percentage of sales accounted for by new firms that built new plant (14.0) was about one half the percentage of firms in this category (27.4), exactly the opposite was true for new firms that acquired plant. They accounted for only 5.9 per cent of all firms in 1970 but for 12.3 per cent of total sales in that year. This is the result of a substantial difference in size of establishment and of firms in each of the two entry categories. The difference in the average size of establishments can be seen in Table 5. On average, new plants created by new firms had 53.5 employees while plants acquired by firms new to the industry had 156.6 employees. The difference was even greater if average size is measured not by establishment size but by average "firm" size in a category - the sum of all establishments divided by the number of firms in that category. These data are reported in Table 6 and show that the entrant that created new plant had on average 55.7 workers in all such plants while the entrant that acquired plant had 227.9 workers. As a result of these size differences, entry via merger was just about as important as entry via creation of new plant when proportion of sales rather than the proportion of firms is used.

TABLE 4

AVERAGE[1] SHARE OF NUMBER OF ENTERPRISES AND OF SHIPMENTS ACROSS 141 CANADIAN MANUFACTURING INDUSTRIES FOR VARIOUS CATEGORIES OF ENTRY AND EXIT: 1970 and 1979

Firm Category	Share of Number of Firms		Share of Shipments	
	1970	1979	1970	1979
All Firms	100.0	100.0	100.0	100.0
All Entrants		32.5(33.0)		26.2(26.6)
1) Entry by Birth		27.4(29.0)		14.0(14.8)
2) Entry by Acquisition		5.9(6.7)		12.3(13.8)
All Exits	42.9(43.5)		30.7(31.1)	
1) Exit by Divestiture	7.5(8.2)		14.5(15.8)	
2) Exit by Scrapping	36.3(37.6)		16.2(16.8)	
All Continuing Firms	57.1	67.4	69.3	73.8
1) with Continuing Establishments	56.5	66.8	63.6	65.7
2) with Divestiture	0.6(1.9)		1.1(3.5)	
3) with Acquisition		2.1(4.1)		3.2(6.3)
4) with Births		3.9(5.2)		4.9(6.5)
5) with Scrapping	3.1(4.3)		4.5(6.2)	

Notes: 1. The average is calculated both across the entire 141 industry sample (the first number) and then for those industries where non-zero observations occur (the bracket figure). Where there is only one figure, the averages are the same.

2. For definitions see Table 3.

Table 5 also indicates that, on average, the new firm that built new plant entered with an establishment of 37 per cent the size of the average new establishment built by continuing firms. It is about 28 per cent the size, if the "firm" level of aggregation as reported in Table 6 is used - where the "firm" is the sum of all establishments divided by the number of firms in that category. While Tables 5 and 6 indicate that firms entering by the creation of plant are smaller than continuing "firms" that create new plant, it must be remembered that the coverage in the continuing firm category is substantially less than 100 per cent while that for new firms extends across almost the entire industry sample. Since average establishment size differs across industries, if observations in the continuing firm category are not randomly distributed across industries, the difference in average establishment size of continuing as opposed to new firms reported in Table 5 will be distorted. In particular, to the extent that continuing firms' new plants are more concentrated in industries where economies of scale are important, then average plant size in this category will be larger than if calculated across the complete sample of industries - as is done for the new firm category because of its more extensive coverage.

In order to overcome this problem, only those industries where there are non-zero observations for both categories can be compared. When this is done the relative size changes substantially. The ratio of average "firm" size for firms creating new plants to that for continuing "firms" doing the same, when size is measured in terms of sales, is .63; the same ratio for establishment size is .67 (s.d. = .63). The new firm then does have a size disadvantage.

TABLE 5

AVERAGE[1] SIZE IN TERMS OF SALES[2] AND EMPLOYMENT OF ESTABLISHMENTS ACROSS 141 CANADIAN MANUFACTURING INDUSTRIES FOR VARIOUS CATEGORIES OF ENTRY AND EXIT: 1970 and 1979

Firm Category	Shipments ($000)[1] 1970	1979	Wage and Salary Earners 1970	1979
All Firms	6,021.2	20,035.0	138.2	146.5
All Entrants		9,306.8		89.5
1) Entry by Birth		6,974.2		53.5
2) Entry by Acquisition		14,899.5		156.6
All Exits	2,897.8		90.3	
1) Exit by Divestiture	5,542.5		165.2	
2) Exit by Scrapping	1,429.7		51.8	
All Continuing Firms	7,637.4	24,605.8	162.1	173.7
1) with Continuing Establishments	7,812.7	25,856.0	164.6	177.5
2) with Divestiture	7,231.1		272.6	
3) with Acquisition		20,161.0		216.0
4) with Births		19,120.1		143.9
5) with Scrapping	3,224.1		95.5	

1) These averages were calculated only across non-zero observations.

2) Shipments are measured in current dollars.

3) For notes see Table 3.

The relative size differential between entrants that acquired plant (conglomerate mergers) and continuing firms that did so (horizontal mergers) differs substantially from the new plant categories. Table 6 indicates that, using the entire industry sample, the former averaged sixty per cent of the latter on a "firm" basis. However when the relative size is calculated only for industries where there were non-zero observations for both, conglomerate mergers were 2.73 times as large as the "firms" created by horizontal mergers. For average establishment size, the ratio is 3.0 (s.d. = 10.2). Where both conglomerate and horizontal merger activity occurred, the units being acquired in the former category were much larger than the latter.

As is the case with entry, the importance of the two exit processes (divestiture versus scrapping) differs depending upon whether number of firms or share of shipments is used. Table 4 indicates that, using the entire industry sample, in 1970, an average of 42.9 per cent of firms in an industry were to exit by 1979, accounting on average for 30.7 per cent of 1970 sales. Although the percentage of sales accounted for by firms exiting by scrapping of plant (16.2) was about one-half of the percentage of firms in this category (36.3), exactly the opposite was true of exiting firms that did so by divesting themselves of plant. They accounted for 7.5 per cent of firms but 14.5 per cent of industry sales in 1970. Thus, exit via sale of plant was not insignificant compared to exit via scrapping of plant when proportion of sales is used as a standard of measurement. On average, smaller establishments (some 52 employees) tended to die via scrapping while larger establishments (165.2 employees on average) were acquired and continued to exist.

TABLE 6

AVERAGE SIZE IN TERMS OF SALES AND EMPLOYMENT OF FIRMS[1] ACROSS 141 CANADIAN MANUFACTURING INDUSTRIES FOR VARIOUS CATEGORIES OF ENTRY AND EXIT: 1970 and 1979

Firm Category	Shipments ($000)[2]		Wage and Salary Earners	
	1970	1979	1970	1979
All Firms	9,456.0	33,103.0	208.2	225.1
All Entrants		12,086.6		113.8
1) Entry by Birth		7,183.2		55.7
2) Entry by Acquisition		21,580.3		227.9
All Exits	3,756.6		113.9	
1) Exit by Divestiture	7,038.1		206.1	
2) Exit by Scrapping	1,487.6		54.6	
All Continuing Firms	13,298.2	47,470.1	275.9	308.1
1) with Continuing Establishments	12,541.5	42,496.6	254.5	272.0
2) with Divestiture	8,304.9		307.1	
3) with Acquisition		35,247.1		378.5
4) with Births		26,277.5		196.2
5) with Scrapping	5,186.9		147.6	

1) A firm is defined as all establishments in one category under common control. It does not refer to average size of all establishments owned by a firm that falls in one category. To obtain the latter, averaging would have to be done across all categories in which a firm fell.

2) Shipments are measured in current dollars.

3) For notes see Table 3.

Table 5 also indicates that the average size of the establishment of firms that exited by scrapping was about the same size as that for new firms that entered by building plant (on average 53.5 employees per establishment). As with entrants who built new plant, exiting firms scrapping plant were primarily single plant firms -- as a comparison of Tables 5 and 6 reveals. The average size of scrapped plants by continuing firms (95.5 employees) is larger than for exiting firms but smaller than for new plant created by continuing firms (143.9 employees). This suggests that the birth and death process for continuing firms led on average to larger sized plants.

As with the entry process, Table 5 shows that the scrapped establishments of exiting firms were smaller than the establishments of continuing firms that scrapped plant. Using the entire industry sample, the ratio of the average establishment's sales in the former category to the latter is .54. When only non-zero observations are used, this ratio is .7 (s.d. = .7). Table 6 shows that when "firm" establishment size is compared, this ratio is .37. Yet, when only non-zero observations are used, the ratio of average "firm" size is 1.0. Thus, in industries where both dying and continuing firms scrapped plant, the relative average size of the scrapped establishments of dying firms as opposed to continuing firms was about the same as for new plants of new firms relative to continuing firms.

The ratio of the average sales of firms that exited via divestiture to continuing "firms" that divested themselves of plant, as reported in Table 6, is .67 and for establishment size as reported in Table 5, it is .61. But the ratio of "firm's" size for industries where both types of divestitures took place is 2.0. The ratio for establishment size is 1.7 (s.d. = 1.9). Thus, as with entry, the merger process for exiting firms involved much larger units than for continuing firms. This suggests that new firms acquired large units from exiting firms, and not from continuing firms in the industry.

Since this paper will be concerned with the creation and acquisition of plant not only by new firms but also by continuing firms, the importance of the latter category should be noted. Table 4 indicates that for all industries, on average 3.9 per cent of all establishments in existence in 1979 were newly created by continuing firms. The average share of their industry sales in 1979 was some 4.9 per cent or about one third that of new plants of new firms. Continuing firms also accounted for the smaller share of acquired establishments. On average, only 2.1 percent of all establishments in 1979 were acquired by continuing firms. Their sales averaged only 3.2 per cent or about one-quarter that of new firm's acquired establishments' share of sales (12.3 per cent).

Turning to the exit process, Table 4 also shows that continuing firms played a secondary role. For all industries, continuing firms' establishments that were scrapped accounted for only 3.1 per cent of all establishments on average in 1970 and only 4.5 per cent on average of 1970 industry sales or about one-quarter of the share of sales of establishments that were scrapped by exiting firms. The relative position of continuing firms in the divestiture process is also minor. The divested establishments of continuing firms accounted for only 1.1 per cent of industry sales on average as of 1970 compared to the 16.2 per cent of divested establishments of exiting firms.

Since new and dying firms' plants were smaller than the size of plants of continuing firms in the comparable categories, it is important to know how the size of continuing firms' new or scrapped plants in the various entry and exit categories related to the size of their continuing establishments. Using only those industries with non-zero observations for both, the ratio of the size of continuing firms' new plants' sales to their continuing plants' sales was 1.1 (s.d. = .8); the ratio of scrapped to continuing plants was 1.1 (s.d. = .8). Continuing firms then were not building plants much larger than average sized plants; nor were they scrapping plants much smaller than average sized plants. In addition they did divest themselves of larger than average size plants; this ratio was 1.6 (s.d. = 1.2). They also acquired plants which on average were 1.2 (s.d. = .7) times the size of their continuing establishments.

Part of this paper is devoted to the difference between the entry and exit responses of domestic as opposed to foreign controlled firms; therefore, Table 7 provides a comparison of the relative numbers and Table 8 gives the share of industry sales in each ownership category. Domestically controlled firms dominated the entry and exit process where establishments were created or scrapped whether measured in terms of absolute numbers or share of sales. This difference does not extend to the other entry and exit categories. When measured in terms of percentage of shipments, domestic and foreign controlled establishments were of approximately equal importance for (a) establishments acquired by new enterprises (b) establishments divested by exiting enterprises (c) divested establishments of continuing enterprises and (d) new establishments of continuing enter-

TABLE 7

AVERAGE NUMBER[1] OF FOREIGN AND CANADIAN OWNED FIRMS ACROSS 141 CANADIAN MANUFACTURING INDUSTRIES FOR VARIOUS CATEGORIES OF ENTRY AND EXIT: 1970 and 1979

Firm Category	Number of Firms			
	1970		1979	
	Cdn.	For.	Cdn.	For.
All Firms	76.6	11.5	63.9	10.7
All Entrants			20.4(21.5)	3.9(4.3)
1) Entry by Birth			18.3(19.7)	2.2(3.1)
2) Entry by Acquisition			2.4(3.4)	2.0(2.7)
All Exits	33.2(34.4)	4.6(5.3)		
1) Exit by Divestiture	4.4(5.5)	2.1(2.9)		
2) Exit by Scrapping	29.2(31.6)	2.8(3.6)		
All Continuing Firms	43.3(44.6)	6.9(7.8)	43.3(44.6)	6.9(7.8)
1) with Continuing Establishments	43.1(44.4)	6.7(7.6)	43.1(44.4)	6.7(7.6)
2) with Divestiture	0.2(1.2)	0.3(1.4)		
3) with Acquisition			1.1(2.7)	0.6(1.9)
4) with Births			1.9(3.2)	1.0(2.2)
5) with Scrapping	1.5(2.8)	1.2(2.4)		

1. Two averages are presented. The first is taken over all industries; the second (bracketed) figure is taken only over these industries where there are non-zero observations. Where there is only one figure, the averages are the same.

2. For other note see Table 3.

TABLE 8

AVERAGE SHARE[1] OF INDUSTRY SALES OF FOREIGN AND CANADIAN OWNED FIRMS ACROSS 141 CANADIAN MANUFACTURING INDUSTRIES FOR VARIOUS CATEGORIES OF ENTRY AND EXIT: 1970 and 1979

Firm Category	Share of Shipments			
	1970		1979	
	Cdn.	For.	Cdn.	For.
All Firms	55.1	44.9	57.5	42.5
All Entrants			16.1(16.9)	10.1(11.2)
1) Entry by Birth			10.0(10.7)	4.0(5.6)
2) Entry by Acquisition			6.1(8.6)	6.1(8.4)
All Exits	19.6(20.3)	11.1(12.7)		
1) Exit by Divestiture	7.5(9.4)	7.0(9.6)		
2) Exit by Scrapping	12.1(13.1)	4.1(5.3)		
All Continuing Firms	35.4(36.4)	33.8(38.1)	41.4(42.6)	32.4(36.5)
1) with Continuing Establishments	33.2(34.2)	30.4(34.2)	36.9(38.0)	28.8(32.4)
2) with Divestiture	0.5(2.9)	0.6(2.9)		
3) with Acquisition			1.9(4.7)	1.4(4.5)
4) with Births			2.6(4.5)	2.3(5.1)
5) with Scrapping	1.7(3.2)	2.8(5.6)		

1) Two averages are presented. The first is taken over all industries; the second (bracketed) figure is taken only over these industries where there are non-zero observations. Where there is only one figure, the averages are the same.

2) For other note see Table 3.

prises. Only for scrapped establishments by continuing enterprises was the foreign share of sales significantly larger than the domestic share.

The averages reported in Tables 7 and 8 reveal several interesting differences in the domestic and foreign turnover process resulting from exit and entry. If measured in terms of average number of firms, the entry and exit process was working only slightly to decrease domestic firm importance. In 1970, 86.9 per cent of the average number of firms in both categories were domestic, while during the subsequent decade, 87.8 per cent of the average number of exits were domestic. In 1979, 85.6 per cent of the average number of firms were domestic while 85.5 per cent of the average number of entrants during the preceeding decade were domestic. However, the two subcategories do exhibit differences. While domestic firms dominated the plant scrapping and birth process (91 per cent of scrappings, 89 per cent of births), this was less evident in the entry and exit merger process (67.7 per cent of divestitures; 54.5 per cent of acquisitions). When relative market shares are compared, the relative importance of domestic plant deaths and scrapping becomes even more pronounced. In 1970, 55.1 per cent of sales were made on average by domestic firms, but 74.6 per cent of exit share by firms scrapping plant was domestic. In 1979, 57.5 per cent of sales were made on average by domestic firms but 71.4 per cent of share entrants that had created plant was domestic. Thus, entry and exit by plant creation and scrapping was more heavily centred on the domestic sector than its relative importance as measured by percentage of sales as of 1970 would have suggested. The percentage of share divested by domestic firms was

51.6 and of that acquired was 50.0. Divestiture and acquisition that led to exit and entry was divided between the domestic and foreign sector in about the same proportion as 1970 industry sales.

The same conclusions may be drawn if the turnover rates are calculated for each of the domestic and foreign categories. The turnover rate can be calculated using average number of firms -- the ratio of average number of domestic (foreign) firms exiting (entering) to average number of total domestic (foreign) firms in 1970 (1979). Or it can be calculated by taking the relative share - the ratio of average share of domestic (foreign) firms exiting (entering) to average share of total domestic (foreign) firms in 1970 (1979). When this is done, it is clear that the birth and scrapping process is much more important for domestic than for foreign firms. The scrapping rate was 38.1 and 21.9 per cent for domestic firms but only 24.3 and 9.0 per cent for foreign using number and share turnover rates respectively. The same entry turnover rates were 28.6 and 17.4 per cent for domestic firms versus 20.5 and 9.4 per cent for foreign firms. Turning to divestiture and acquisition rates, the reverse is true. Turnover rates for domestic divestiture were 5.7 and 13.6 per cent while foreign divestiture rates were 18.2 and 15.5 per cent for the two measures. For acquisitions, domestic turnover rates were 3.8 and 10.6 per cent while for foreign, they were 18.6 and 14.4 per cent. Thus foreign acquisition and divestiture turnover rates are more significant than domestic, especially when measured using number of firms, but they are much less so when using relative share. This implies that domestic divestitures and acquisitions were very much larger relative to average domestic size plant than the same ratio for foreign firms.

Tables 7 and 8 also show that the domestic sector has increased the average share of shipments from 55.1 to 57.5 per cent. The entry and exit process did not contribute to this gain. Exit by domestic firms was 3.5 percentage points greater than entry. However, continuing domestic firms expanded their share by some 6 percentage points. This was made up of a 3.7 percentage point gain in continuing plants and a net gain of 2.3 percentage points from greater acquisition and plant creation activity than plant scrapping and divestiture. The foreign sector lost position both from the entry and exit process (-1.0) and from a decrease in the share of continuing firms (-1.4).

Earlier it was suggested that the entry and exit processes might differ in their response to different variables. While the validity of this hypothesis must ultimately await the regression results, Table 9 provides evidence that entry and exit responded differently to growth opportunities. This table reports the entry and exit rates (calculated as a percentage of the number of firms and of industry sales in 1970) for four groups of industries -- those experiencing negative, slow, moderate, and fast real growth. The entry rate (whether for plant birth or acquisition) increases with the growth rate. On the other hand, while the exit rate is higher for declining than growing industries, it does not decline across the three categories of positive industry growth rates. Thus, for slow, moderate and fast growing industries, the main adjustment mechanism is births. These results are similar to those reported by Birch [1982] for the United States.

A comparison of entry and exit rates across the four growth classifications shows that except for declining industries, the effect

TABLE 9

AVERAGE OF ENTRY AND EXIT BY INDUSTRY GROWTH RATE FOR 141 CANADIAN MANUFACTURING INDUSTRIES: 1970-79

Entry Exit Indicator	Industry Growth Rate				
	Decline (1)	Slow (2)	Moderate (3)	Fast (4)	Canadian Average (5)
As a percentage of number of firms in industry in 1970[b]					
ENTRY	26.6	31.9	35.9	46.5	36.1
via Birth	19.0	25.0	27.9	37.1	28.1
via Acquisition	7.9	7.3	9.8	11.3	9.2
EXIT	47.1	40.4	40.8	42.3	42.3
via Scrapping	38.4	31.3	29.5	31.4	32.2
via Divestiture	10.2	9.8	13.7	12.2	11.6
As a percentage of industry value of shipments 1970					
ENTRY	25.8	26.9	37.3	62.0	39.5
via Birth	12.3	16.2	17.9	36.0	21.6
via Acquisition	13.5	10.7	19.3	26.0	18.0
EXIT	40.7	28.0	28.7	28.6	30.7
via Scrapping	23.9	16.5	11.6	15.4	16.2
via Divestiture	16.8	11.6	17.1	13.2	14.5
Number of industries	26	36	39	40	141
Number of firms					
1970	53.7	98.3	69.2	119.7	88.1
1979	44.8	79.1	60.4	103.7	74.6
Number of Employees					
1970	5,442	9,378	11,683	8,127	8,935
1979	4,744	9,238	13,222	10,528	9,874

a) Growth rates are for industry shipments using 1970 and 1979. Annual growth rates for four categories are as follows: Decline 0-2; Slow 0-2; Moderate 2-4; Fast 4 plus.

b) If entry rates are calculated with 1979 as the base, the conclusions still holds that they increase as industry growth rate increases.

of births (when measured by percentage of industry value of shipments as of 1970) offsets or exceeds that of deaths. Even in the declining industries, where 41 per cent of 1970 sales is lost by exiting firms, some 26 per cent is created by the entry of new firms by 1979. Thus adaptation cannot be characterized as resulting just from exits in declining industries or entry in growing industries. Significant amounts of entry and exit occur across the spectrum and it is to the determinants of each that the subsequent sections turn.

THE ENTRY PROCESS

Entry is disequilibrium phenomenon. Most commonly, it is modelled as the result of a difference between price and average cost. Whi.e for some pedagogical purposes this is a tractable way to present the entry process, it has led the applied literature to concentrate on this or a similar measure of profitability as the primary determinant of the disequilibrium process. This paper starts with the different presumption that entry can be expected even when price and long-run average cost are equal.

There are a number of reasons for taking this position. First, at any time, there may be a variation in actual average firm costs even though reported average costs are the same.[8] Therefore more efficient firms can expect to enter and still earn a profit even if the industry reports zero profits as a whole. Secondly, even if real average firm costs are identical, a new firm may have a cost advantage that will allow it to enter profitability. Thirdly, at the level of aggregation used in most industry studies, some entering firms may expect to supplant the production of existing firms by producing, what is in the eyes of the consumer, a superior product even though its costs are the same as those of existing firms.[9]

In this paper, entry is assumed to respond to the signal that entrants can expect to make positive profits -- as has been done elsewhere. But in contrast with the traditional approach, entry is not regarded as blockaded even if traditional signals indicate that profits are no greater than normal.[10] Nor is entry treated just a supply augmenting phenomenon as is implicit in the model that has entry dependent upon excess profitability. Entry is assumed herein to be a dynamic process involving both the partial and complete replacement of existing firms.

Variables that are meant to capture this dynamic process must reflect the likelihood that new firms can enter and replace old firms or that they can enter and capture part of the market irrespective of the level of profits being earned in the industry. Two variables -- existing number of firms and market growth -- are used to capture that part of the entry process not directly related to profitability. Thus entry will be modelled as responding to 1) perceived profitability after entry less the normal opportunity cost of capital 2) the initial industry size as measured by number of firms and 3) the growth of industry demand. The estimating relationship can be represented as

$$1) \qquad E_t = a_0 + a_1N_t + a_2G_t + a_3(PP_t - PN_t)$$

where E number of new entrants

N	number of firms in the industry
G	room for new firms as a result of growth
PP	perceived profitability after entry
PN	"normal" profitability or the opportunity cost of capital

The number of firms (N) is entered to capture the primary determinants of the replacement process that is an integral part of entry. New firms are assumed to replace existing firms because of new or better products or because of more efficient production processes. If each firm in the economy is regarded as having a probability a_1 of being replaced by a new firm, then a_1N represents this total effect in industry t.

Past attempts to model entry have generally used as a dependent variable the ratio of entrants to existing number of firms and regressed this variable on such independent variables as profitability, growth, and entry barriers. (Mansfield [1962], McGuckin [1974], Duetsch [1975], Gorecki [1975)]. This approach makes a strong assumption about the effect of the independent variables -- that the response of entry to a given change in these variables is greater, the greater is the number of firms in the industry. There is little *a priori* reason for making this assumption about the effect of all the independent variables.[11] Therefore, this paper will assume that number of firms enters as a separate variable.

There are, however, reasons for hypothesizing that the probability of replacement a_1 does vary across industries. The degree to which a new firm can expect to replace an existing one should be a function of the inertia of customers. Two characteristics of an industry are hypothesized to have a significant effect on the probability of replacement - research and development intensity and advertising intensity. Two interpretations of the effect of these variables are possible. On the one hand, it might be argued that a high research and development intensity is indicative of rapid new product development and should allow more firms to enter by replacing old firms that are not successful in keeping up with the rate of product innovation. In the same way, it could be argued that a high advertising intensity exists where consumers place a high value on information and one where such information will be tested by the sampling of new products. On the other hand, an alternate interpretation of the effect of each of these variables, more in keeping with the traditional entry barriers literature, might be adopted. In this case, the effect of both variables would be negative.

Growth is entered as a separate term in equation 1 so as to capture a second aspect of the stochastic entry process. The ease of entry depends upon the degree to which new firms can expect to capture customers. Markets contain a mix of loyal as opposed to adventuresome customers. The ease of entry depends upon the degree to which the new firm can expect to have its products sampled by customers. A growing market is more likely to be associated with new customers and therefore, there is a greater likelihood of new firms capturing market share. The effect of growth is assumed to depend upon the extent to which economies of scale exist in the industry. That is, the room for new firms should be measured by real growth divided by a measure of minimum efficient scale (m.e.s.). In the same way that a_1 is assumed to be a function of advertising and research and development intensity, a_2 the coefficient on growth is also allowed to be a function of these two variables. The same arguments that were made above with respect to the effect of these two variables also are relevant here.

It should be emphasized that the effect attributed herein to growth is different than that normally posited for growth. Growth enters the entry model because it facilitates entry independently of any effect it may have on profits. The higher the growth rate, the easier it is for new firms to capture a section of the market. This is different from stating that growth affects the limit price; that growth affects the extent to which entrants presume existing firms will expand production in response to new entry. The existing entry limit pricing literature has often concentrated only on models that presume the expansion of existing capacity guarantees on equal expansion of sales.[12] The approach adopted here is based on the notion that existing firms cannot be guaranteed to maintain all their customers in a market that is static, nor can they capture all new customers in a growing market.

The third term in the entry model (1) posits that entry is a linear function of the degree to which perceived profitability after entry (PP) exceeds the opportunity cost of capital (PN) for participants in the industry. It captures the disequilibrium effect due to abnormal profitability. Since the difference between the perceived profitability and the opportunity cost of capital is not directly observable, a proxy is required.

Potential entrants are assumed to base their expected post-entry profitability on the existing industry profit rate less a margin occasioned by the costs of entry. This margin reduction is determined by the same factors that govern the height of what the limit pricing literature has referred to as the entry blockading profit level less the opportunity cost of capital. For it is this difference that a potential entrant can expect to incur after entry. Thus

$$2)\qquad PP - PN = [P_a - [P_f - P_n]] - P_n$$

where

P_a actual firm profitability
P_f entry blockading level of profitability
P_n normal profitability

The height of the entry blockading level of profitability (P_f) above P_N will be written as a function of the traditional vector of entry barriers (B).[13] In addition, normal profitability will be assumed to be determined by the risk free level of profitability f_0 and a vector of the risk characteristics of the industry (R). Thus

$$3)\qquad P_f - P_N = b_0B$$

$$4)\qquad P_N = f_0 + f_1 R$$

Substituting (3) and (4) into (2) gives[14]

$$5)\qquad PP - PN = P_a - b_0B + f_0 + f_1 R.$$

Substituting (5) into (1) yields[15]

6) $E_t = a_0 + a_1N_t + a_2G_t + a_3P_a + a_4B + a_5R.$

This paper then emphasizes that entry and exit flows from more than just disequilibrium profitability. It also chooses a somewhat longer time period for study -- 10 years -- than is normally done. The two differences are related. Since this paper is part of a series on industry adaptation to structural change, a long enough time period was required to catch what is at best a slow process of change. The primary purpose of this paper was to estimate the reaction of entry and exit to growth, especially that resulting from foreign trade and this necessitated the choice of a decade as the period of observation.

A priori, there would appear to be less reason to believe initial year profit disequilibrium affects the whole period when that period is ten years in length. Structural variables such as numbers of firms and expansion of the market are more likely to dominate the longer run. Shorter time periods are more likely to catch short run profitability effects but shorter time periods suffer from increased noise in the dependent variable because there will be fewer non-zero observations. Moreover,in the short run, long run trends in such independent variables as growth may not be discernible.

In the next section, the variables that were used to explain the entry and exit process are discussed in more detail.

THE VARIABLES

A. Size of Industry

(i) Existing Number of Firms (N)

The structural equation (6) hypothesizes that entry depends upon the number of firms in the industry because of the replacement process. In the structural entry equation (6) the following independent variable was used to catch this effect.

N	The number of unconsolidated firms in an industry as of 1970.

In order to allow for differences in response to the presence of foreign as opposed to domestic firms, the total number of firms was broken into

NC	The number of Canadian owned unconsolidated firms in an industry as of 1970.
NF	The number of foreign owned unconsolidated firms in an industry as of 1970.

(ii) Existing Number of Firms and the Effect of Research (NTD2)

Since it was hypothesized that the coefficient of replacement attached to N would reflect the ease of replacement and that this would depend upon innovativeness in an industry, the following variable was created

NTD2	The number of unconsolidated firms in an industry as of 1970 multiplied by a dummy variable that takes on a value of 1 when the research and development variable takes on a value greater than its mean.

As indicated previously, the sign of this variable will indicate the extent to which innovativeness increases or decreases the ease of entry.

(iii) Existing Number of Firms and the Effect of Advertising (NTD1)

It was also argued that the coefficient of replacement attached to N would depend upon the importance consumers attached to information and thus advertising would affect the ease of replacement. Thus the following variable was created

NTD1	The number of unconsolidated firms in an industry as of 1970 multiplied by a dummy variable that takes on a value of 1 when the advertising variable takes on a value greater than its mean.

Once again the sign of this variable will indicate the extent to which advertising increases or decreases the ease of entry.

(iv) Total Value of Sales (SALES)

If the entry equation (6) is written in reduced form, sales normalized by m.e.s. replaces number of existing firms. Therefore, in the reduced form equation for entry, the following variable was included

SALES	The total value of industry sales in 1970 divided by the 1970 estimate of minimum efficient scale of plant.

B. GROWTH VARIABLES

(i) Growth in Sales (GT, GX, GD.)

Firm entry is expected to result from industry growth. However, not every industry is expected to respond to growth in the same way because of differences in the size of minimum efficient scale of plant (m.e.s.).[16] To correct for this, growth of sales in real dollars between 1970 and 1979 is divided by the minimum efficient scale of plant estimated for 1970. Since most entrants are single plant firms it is reasonable to deflate growth using minimum efficient plant rather than firm size. Thus total growth in domestic production is

GT	The real growth in domestic production between 1970 and 1979 divided by the 1970 estimate of minimum efficient scale of plant.

It is possible that different sources of growth (i.e., from exports as opposed to the domestic market) may elicit different entry responses. For instance, the Canadian Royal Commission on Corporate Concentration, [pp. 64-65] argues that large firms are required in the export market. To test for the possibility of unequal responses to different sources of growth, the growth of exports and of imports is added.

GM	The real growth in imports between 1970 and 1979 divided by the 1970 estimate of minimum efficient scale of plant.
GX	The real growth in exports between 1970 and 1979 divided by the 1970 estimate of minimum efficient scale of plant.

Since GT = GD + GX, the net effect of exports then is the sum of the coefficients on GT and GX.

(ii) Growth and a Change in M.E.S.

The growth variables deflated as they are by m.e.s. are meant to capture the room for new firms of efficient size. However by using minimum efficient size as of 1970, GT ignores the effect of increases in m.e.s. that occurred between 1970 and 1979. If m.e.s. increased, GT overstates the room for new firms. In effect, the total new room (ROOM) is

$$\text{ROOM} = \frac{\text{VS1979}}{\text{MES1979}} - \frac{\text{VS1970}}{\text{MES1970}}$$

where VS value of sales

MES minimum efficient plant size

An accompanying paper (Baldwin and Gorecki [1982] shows that changes in m.e.s. did occur and therefore the assumption that m.e.s. is constant needs to be relaxed. The variable ROOM can be decomposed

$$\text{ROOM} = \frac{\text{VS1979}}{\text{MES1979}} - \frac{\text{VS1979}}{\text{MES1970}} + \frac{\text{VS1979}}{\text{MES1970}} - \frac{\text{VS1970}}{\text{MES1970}}$$

Since the second term is just GT, the first term (EXCESS) will be added to the set of independent variables. This variable captures the number of firms that would have had to exit the industry as a result of the change in m.e.s. over the period. It is defined as

EXCESS The value of industry sales in 1979 divided by the change in m.e.s. between 1970 and 1979 where both numerator and denominator are expressed in 1970 dollars.

The coefficient on this variable is expected to have the same sign as GT.

(iii) Growth and Sub-Optimal Capacity

As an industry expands, growth can elicit two responses - either external or internal to existing firms. External response comes from the entry of new firms; internal response can either be the creation of new plants or the expansion of existing ones. If plants are suboptimal in size, then it may be the case that growth will come primarily through internal expansion rather than through entry. To test this proposition, an interactive term (EFF) was created

EFF is defined as the real growth of industry sales (1970-79) divided by the estimate of minimum efficient scale plant (GT), all multiplied by a dummy variable with the value of 1 when average size of plant relative to minimum efficient scale of plant is greater than the mean of this variable.

Should entry be more likely when plants are relatively efficient in size, then the coefficient attached to this variable will be positive. On the other hand, this variable may be measuring the relative viability of small firms as opposed to large. Caves and Pugel [1980b] have emphasized the importance of using actual distributions of small and large firms to indicate when viable strategies exist that permit a relatively large range of different firm sizes to coexist. If this is what EFF captures, the coefficient on this variable will be negative.

(iv) Growth and Protection

There exists a Canadian literature based on work by Eastman and Stykolt [1967] postulating a relationship between the existence of inefficient scale plant or excessive product differentiation and tariff protection -- what has become known as the miniature replica hypothesis. Since the previous variable (EFF) may not completely catch either the concept of inefficient scale plant because of measurement error or the extent to which an excessive number of product lines were produced, a second interaction term was created for this purpose

MR The real growth of industry sales, divided by m.e.s. (GT), multiplied by a dummy variable which takes on a value 1 when both concentration and nominal tariffs are higher than the mean of both variables calculated for 1970.

This interaction term attempts to capture the joint effect of both tariffs and concentration since it is this combination that Bloch [1974] found to matter. If protection in highly concentrated industries affects average plant size, this variable should have a positive coefficient since entry rather than internal expansion is required if suboptimal plant size is to be maintained.

(v) Growth and Research and Development (GTRD)

Earlier it was hypothesized that the ease of entry depends upon the extent to which new firms can capture part of a growing market and that this should be related to the degree of innovativeness in product markets. To capture this effect, another interaction term (GTRD) was created

GTRD	The real growth of industry sales divided by m.e.s. (GT) multiplied by a dummy variable which takes on a value of 1 when the research and development variable takes on a value greater than its mean for 1970.

(vi) Growth and Advertising (GTAD)

It was also hypothesized that the ease of entry depends on the importance of advertising. To capture the effect of advertising on the growth term, the variable GTAD was created.

GTAD	The real growth of industry sales divided by m.e.s. (GT) multiplied by a dummy variable which takes on a value of 1 when the advertising variable takes on a value greater than its mean for 1970.

C. PROFITABILITY

In previous studies of the entry process, (Orr [1974a], Deutsch [1975], Gorecki [1975]), the number of entrants has invariably been hypothesized to be a function of profitability. This view implicitly characterizes entry as a disequilibrium process. Since our data on entry cover the period 1970 to 1979, it is not obvious *a priori* that disequilibrium can be expected to have persisted over the decade and how, therefore, profitability should be expected to influence the entry process. This is especially the case in light of the two previous Canadian entry studies (Orr [1974a], Gorecki [1975]) that found domestic firms did not respond to profitability. Therefore, a number of variables were defined.

(i) Beginning Year Profitability (PB)

The first profitability variable used was the gross rate of return earned by the industry in 1970

PB Total activity value added less wages and salaries divided by industry gross capital stock for 1970.

The coefficient should be positive though it may have little significance since the entry data spans the period from 1970 to 1979.

(ii) Profit Differential Top Half versus Bottom Half (PCOMB)

Potential entrants may not base their expectations of profitability on average industry profitability (PB) but on the experience of the class into which they will fall. Since the average employment size of entrants was smaller than for continuing firms, an interactive profit variable was calculated that was meant to capture a) the general state of industry profitability and b) the extent to which smaller firms earned less than large firms. The general state of industry profitability was represented by

PCON The weighted gross rate of return in 1970 of all firms that continued in the industry throughout the decade.

This purges the average profitability figure of those firms that exited over the decade. The relative success of small versus large firms was estimated with

PDIF The difference between the gross rate of return of

> the top half of the industry, ranked on the basis of size, and the gross rate of the bottom half in 1970.[17]

The two are then combined in a variable

$$PCOMB = (100-PCON)PDIF.$$

This variable is inversely related to the difference between large and small firm profitability. As PCOMB increases, small firms will be less likely to cover their opportunity costs of capital. The coefficient attached to this variable should be negative.

(iii) Coefficient of Variation of Margins/Sales Ratios (CVAR)

In a separate attempt to capture the notion of profit risk, a measure of the dispersion of profitability was calculated

CVAR The coefficient of variation of the net margins/sales ratio for 1970. Net margin is total activity value added less wages and salaries.

This variable provides a measure that is positively related to the dispersion of returns and negatively to the average return. Like PCOMB, it is an indirect measure of the extent to which a number of firms are doing poorly. Unlike PCOMB, it does not concentrate on small firms' experience. The coefficient on this variable is expected to be negative.

(iv) Probability of Negative Returns (PNEG)

Instead of using the indirect measures of profitability outlined previously, a measure of the probability of failure can be used. Stonebraker [1976] suggests the risk of entry (as it affects profits) should be related to the proportion of firms with negative profitability. Since entrants are on average small firms, this subset was used to create

PNEG The relative proportion of small firms with negative net margins. Small firms are defined as those accounting for the bottom 50 per cent of employment.

The expected sign of the coefficient of this variable is negative.

In addition, the relative share of output of firms with negative margins in the bottom half of the industry was calculated. This weighted average of the probability of failure performed similarly to the unweighted average and is not reported subsequently.

(v) Profit Growth over the Decade (RG)

Each of the previously calculated profit variables is estimated for the year 1970. In order to catch the likelihood that entry should be larger not just where the opening year profitability was higher but where it continued higher, the ratio of final year (1979) gross rate of return to opening year (1970) gross rate of return was also included. Three different variables were estimated

RG1 The ratio of average industry gross rate of return in 1979 to 1970.

RG3 The ratio of large firm (top half of employment) gross rate of return in 1979 to 1970.

RG6 The ratio of small firm (bottom half of employment) gross rate of return in 1979 to 1970.

RG1 and RG3 were so closely correlated (.9) that for practical purposes they must be considered identical. Therefore only top half and bottom half profitability were used. Their coefficients were expected to be positive.

D. BARRIERS TO ENTRY

Because it is likely that barriers to entry might influence the number of new entrants, several such variables were included. It should be noted that entry barriers in the form of m.e.s. have already been incorporated into the growth variables. Therefore, this entry barrier variable tests, not whether m.e.s. has any effect, but whether there is an effect in addition to that already included in the growth and the number of firms variable. The entry barrier variables used were

(i) Plant Economies (ES)

Although the growth variable contains the minimum efficient scale variable, it was included separately to test for its effect via the profitability term in equation #6. The variable used was

ES The ratio of minimum efficient scale to domestic market size, 1970.

Its expected sign is negative.

(ii) Cost Disadvantage of Small as Opposed to Large Plants (CDR)

Caves et al. [1975] found that the cost disadvantage of small relative to large plants was an important determinant of performance. They used the labour productivity of small firms relative to large firms to proxy the cost disadvantage of small firms. In an accompanying paper (Baldwin and Gorecki [1982]), it was discovered that this variable caught small firm disadvantage only where the size of the market relative to m.e.s. [SALES] was small. Therefore, the variable used here was

CDR The ratio of value added per man-hour for small plants over that for large plants in 1970, times a dummy that takes on a value of 1 where SALES is greater than its mean and 0 otherwise.

Its sign is expected to be positive since this variable is larger when small firms have less of a productivity disadvantage compared to large firms. However, as with the efficiency variable (EFF), this variable may be catching the extent to which small firms can exist beside large firms. Caves [1980a] refers to this as the truncation effect. CDR is large when small firms are removed from the industry by trade and other exogenous affects. If this is the case, CDR may have a negative sign.

(iii) Firm Level Economies (RCR)

The effects of concentration and economies of scale cannot always be separated because of the manner in which the latter is calculated (Davies [1980]). Indeed the early structure-conduct-performance studies in Canada found that both concentration and economies of scale could not be separately included without severe multicollinearity problems arising. (Jones et. al. [1974]). In order to overcome this difficulty, a new variable was defined

RCR The difference between the four firm concentration ratio and four times the ratio of minimum efficient scale plant to industry sales for 1970.

This is the residual in the concentration ratio not accounted for by plant economies of scale. Its coefficient is expected to be negative.

(iv) Product Differentiation (AD).

As a proxy for barriers to entry that arise from product differentiation, the following was included

AD The advertising sales ratio multiplied by a dummy variable that takes a value of 1 for all consumer non-durable goods industries, 1970.

The use of the dummy variable for non-consumer goods industry builds on the earlier work by Porter [1974] that found a difference in barriers created by advertising in non-convenience as opposed to convenience industries. Its sign is expected to be negative.

(v) Research and Development (RD)

Because of the possibility that high technology provides a type of barrier that is not captured in the previous set of entry barrier proxies, the importance of research and development was included as a separate variable. Several alternate measures of this variable were available. The ratio of R & D expenses (current, current plus capital, internal, internal plus external) to sales were all tried as well as the ratio of R & D personnel to all wages and salary earners. Essentially they all performed in the same way. The subsequent results report the coefficients for the employment ratio.

RD The ratio of research and development personnel to all wage and salary earners, 1975.

Its coefficient is expected to be negative.

E. OTHER VARIABLES

(i) Regional Industry Classification (R)

There are a number of reasons to postulate that entry may be affected by whether an industry is regional or national. First, the concentration ratios, which are calculated on a national basis, may understate regional concentration. Secondly, success in regional industries may require skills that one type of firm (domestic as opposed to foreign) possesses in greater abundance. If the Caves theory of foreign investment [1971, 1974] is correct, multinationals invest abroad when marketing or other skills offset the risk of penetrating foreign markets. Regional markets involve even greater problems in matching specific tastes and may therefore face less penetration from foreign owned firms. The following variable was used

REG A regional dummy variable taking on the value of 1 when the industry is judged to be regional in nature.

For the above mentioned reasons, the coefficient on the regional dummy variable is expected to be negative, but especially so for foreign controlled firms.

(ii) Variability of Demand (VAR)

Risk is expected to have a positive effect on the required rate of return in an industry and therefore it might be expected to have a negative influence on the number of firms. Although measures of financial risk have already been included, an attempt was made to capture the riskiness of an industry by including the variability of sales. This was defined as

VAR The standard deviation of real value of shipments around the logarithmic regression of shipments on time for the period 1970-79.

While the variable is expected to have a negative coefficient, there are other factors here that may offset the hypothesized effect. The adaptation to variability may be best accomplished by existing firms changing output, by fringe firms entering and exiting during the cycle, or by imports. Which process is optimal depends upon the shape of the firm's cost curve and the costs of entry and exit. If the latter are relatively small compared to the costs of changing output levels by existing firms, it is conceivable that this variable could have a positive coefficient.

(iii) Trade Effects (M, CA)

There are two reasons to include measures of trade exposure in the entry process. First, previous studies (Jones [1974], Caves [1980a]) of the performance of the Canadian manufacturing sector have found that measures of the importance of trade have a significant bearing on industry performance. Secondly, the entry barrier measures, in that they are calculated relative to the domestic market, may have considerable bias in them in industries where imports or exports account for a large percentage of sales. For this reason the following two trade variables were also included in the entry equations.

M The proportion of domestic disappearance accounted for by imports as of 1971.

CA The comparative advantage of the industry, defined as exports minus imports divided by the sum of exports plus imports as of 1971.

The comparative advantage variable is expected to have a positive coefficient since entry should not be as affected by the entry barrier variables included in the entry equation. Because a regression of total number of firms on the size of the market and the entry barrier variables showed a significantly positive coefficient on import share -- thereby indicating a tendency for small average firm size to be associated with imports, a positive coefficient on M is expected.

(iv) Foreign Ownership (FO)

Although entry in each category is divided into domestic as opposed to foreign entry, it is still of interest to test whether entry by either type of firm was influenced by the presence of the other. To test for this effect, the importance of foreign ownership was included as a separate variable

FO The proportion of industry sales accounted for by foreign controlled firms as of 1970.

If previous patterns persisted, this variable should be negatively related to domestic entry and positively related to foreign entry.

THE REGRESSION RESULTS

A. THE DATA BASE

The data for both independent and dependent variables was collected for the universe of 167 4-digit Canadian manufacturing industries. Contrary to other recent studies (Caves et. al. [1980]), the data base did not have to rely upon only those industries for which published data was available. Therefore, estimating missing observations was not a major problem, as it has been for others. However, in a small number of instances, data was not available at the 4-digit level but at a somewhat more aggregative level of industry classification, thus necessitating some porating or spreading. Nominal and effective tariffs and advertising variables were based on a 122 industry division of the manufacturing sector. Research and development statistics were available only at the 3-digit level which divides the manufacturing sector into 112 industries. Finally, the trade data needed some minor porating for 21 of the 4-digit industries. An appendix is available that details the data base and its sources.

Examination of the correlation matrix indicates there are few major problems a priori that might lead to imprecise estimates due to multicollinearity. But there are several exceptions to this that require comment. First, the two profitability variables (PB and PCOMB) were highly correlated and regressions with both were often characterized by coefficients with perverse signs or insignificant estimates. On their own, each usually was correctly signed. However, small firm well-being was invariably more significant and, therefore, it is this variable that was used subsequently. Secondly, the profit growth variables (RG3, RG6) suffer the same problem. Once again it was small firm profitability growth that was most significant and it was used subsequently. Thirdly, foreign ownership (FO) was correlated with both research and development and plant scale economies. The inclusion of FO sometimes reduced the impact of the former though not the latter. However, the impact of this change was generally not sufficient to observe the effect of research and development, if it was highly significant to begin with. Finally, plant scale (ES) and residual concentration (RCR) were negatively correlated. Therefore, each was included, both together and separately, to test for imprecision in the estimates caused by this high correlation.

While the extensive nature of the data base allows for a wealth of hypotheses to be tested, the sheer number of variables posited to affect the entry/exit relationship threatens to test the patience of even the most diligent of readers. Therefore, in what follows, not all coefficients are reported. The results reported here focus on a set of core variables. Because the focus of this paper is on the effects of trade liberalization, export, import, domestic growth, and EXCESS are always included. The interaction terms on growth are omitted unless they offered an implication of significance. With respect to proftiability variables, only small firm wellbeing (PCOMB) is always included irrespective of its significance. Other variables are included only if they were significant. With respect to profitability variables, only the plant scale, residual concentration, and cost disadvantage ratio are always included. Advertising and research and development are only included when there was some indication that they might be significant. With respect to SIZE variables, number of firms is always broken into its subcomponents and both advertising and R & D interaction terms are always included. As to the "other" category, variables are only reported if there was some indication of significance.

The subsequent discussion will dwell at length only on the variables that were significant. Nevertheless, it is useful to summarize the variables that were generally found to be unimportant. First, the interaction terms on growth were generally not significant. Secondly advertising and R & D almost were never significant on their own; that is, they did not affect the entry blockading profit level. This is not the result of their inclusion both separately and as an interaction effect. Exclusion of these interaction terms does not affect the significance of either of these variables. Finally, virtually none of profitability variables besides small firm well-being are ever significant.

B. METHODOLOGY

The entry model derived in equation (6) provides an estimation problem. Profitability can be treated as exogenous because it can be hypothesized to depend upon past growth and entry but this is not the case for the number of firms. The existing number of firms depends upon previous entry and therefore upon entry barriers. Not all of these barriers will have been captured exactly in the entry barriers used and part of this effect will reside in the error terms of the entry equation and of the equation determining the number of firms at the beginning of the period. Since the error terms that affect past entry and therefore total number of firms and present entry are very likely to be correlated over time, N_t is simultaneously determined with E_t and its inclusion in a simple ordinary least squares regression will give biased estimates of the entry barrier coefficients. This problem might be overcome by the use of the appropriate simultaneous estimation technique.

An alternate solution is to use a reduced form entry equation. The total number of firms is just the result of past entry (and exit) and, therefore, can be written as a function of past growth (or total sales at the beginning of the period) and entry barriers.

7) Let $E_t = a_0 + a_1N_1 + a_2G_t + a_3P_A + a_4B + a_5R$

and

8) $N_t = a_0' + a_1'S + a_3'B$

where S_t = sales/MES

then

9) $E_t = a_0 + a_2G_1 + a_1a_1'S + (a_4 + a_1a_3')B + a_3P_A + a_5R.$

While estimating equation (9) by simple ordinary least squares provides unbiased coefficient estimates, the coefficients of such a regression must be interpreted with care. In particular, the coefficients on entry barriers (B) are combinations of those that affect entry in the present period (a_1,a_4) and those that have affected entry in the past (a_3').

Each of the two approaches - the structural equation (6) as opposed to the reduced form (9) - has drawbacks. While the simultaneity bias can be removed when the structural equation with total number of firms is used, collinearity problem is removed, when the reduced form equation is employed, the coefficients in this equation do not represent just the effect of entry barriers on entry. They are a linear combination of the effects of entry barriers on the entry process and on the distribution of firms across industries.

Because none of the estimation techniques were clearly superior _a priori_, all three were carried out to test the robustness of the results. Both ordinary least squares and two stage least squares were used for the structural model (#6) while ordinary least squares was used for the reduced form of the relationship (9) where number of existing firms (N) is replaced with the variable SALES. The two stage least squares regression treated existing number of firms as endogenous. The results for the three different methods were sufficiently similar that only the OLS results of the structural equation are reported subsequently.

Other variables besides N might be assumed to be endogenous for much the same reasons. It is likely that profitability (PB or PCOMB), profit growth sales (RG3, RG6), and foreign ownership (FO) are not independent of the error term. Similarly, export and domestic growth may be a result of entry especially when the entrant introduces lower cost production methods that reduce consumer prices. All of these suggest a simultaneous equations treatment to reduce potential bias in the coefficient estimates. However, after some experimentation, this approach was abandoned. A simultaneous equations approach provides better estimators only if the instruments being used to purge endogenous variables of their endogeneity have a reasonable degree of explanatory power. Experimentation revealed that a number of variables that might be endogenous, especially the growth variables, could not readily be explained by the variables in the data base. Therefore, it was decided to report only ordinary least squares results for the structural equations.

The sample chosen for the analysis consisted of the 167 4-digit manufacturing industries less some 26 industries that were classified as miscellaneous. However, it was recognized that some of the remaining industries might have been so diverse that they too should have been omitted. Therefore two additional regressions were run using different criterion for excluding "aberrant" observations. In the first case, all observations whose standardized error was greater than four were removed. In the second case, all observations whose standardized error was greater than two were removed. In each case ordinary least squares was the technique used for estimation of the structural equation.

Most of the results reported subsequently were robust. The one aspect that changed most was the relative magnitude of the export and import coefficient - but only when the most extreme outliers were removed. When the complete set of outliers of more than two standardized errors was removed, the results were remarkably similar to the 141 observation sample. Thus it may be concluded that outliers as a whole do not dramatically influence the results.

In the subsequent discussion of each equation, the significance levels, which would just allow rejection of the null hypothesis that the coefficient is zero, are given in each table. These are one-tailed tests of significance. In the following discussion, a variable is referred to as significant when the significance level is 10 per-cent of less. Weakly significant variables are those between 10 and approximately 20 per cent. This standard was chosen because in each reported run not all insignificant variables are excluded. When the highly insignificant variables were excluded, the significant or weakly significant variables by this standard did not change their signs (or their estimated values by much) but did have their significance levels increased substantially.

In what follows, the regression results for two categories are omitted -- N31 (divestitures by exiting firms) and N11 (divestitures by continuing firms). The descriptive statistics outlined in Tables 3 through 8 suggested plants divested by exiting firms primarily were those acquired by firms that entered, and that continuing firms primarily acquired plant divested by other continuing firms. The regression results for N31 and N11 essentially confirmed this, N31 and N11 were the mirror images of N22 and N12 respectively. Therefore only the latter are reported.

C. THE REACTION OF NEW FIRMS TO OPPORTUNITY FOR EXPANSION

(i) Entry by New Firms Building New Plant (N23)

The coefficients of the entry process for both domestic and foreign controlled firms are presented in Table 10.

While both domestic entry (N23C) and foreign entry (N23F) are negatively related to the profitability variable (PCOMB), neither is significant. Nor are most of the entry barrier variables that are hypothesized to affect the entry blockading profit level significant. The one exception is advertising intensity for foreign firms. While it is tempting to attribute this lack of significance of the profitability terms to the length of period adopted here, this explanation is inadequate. For the other entry variables (N22, N13, N12) are significantly related to the profitability variable. Nor does the explanation lie in the choice of profit variable. When other measures of profitability, such as large firm rate of return, or average rate of return, or Lerner type price-cost margins, were tried separately, the coefficients possessed the appropriate signs but were not as significant.

The domestic and foreign categories exhibit both similarities and differences in the manner that they respond to entry barriers. Domestic entry is negatively related to plant economies of scale (ES) and to residual concentration (RCR). However, neither is significant whether included separately or together. In contrast, foreign entry (N23F) is not negatively related to either ES or RCR. Indeed, the coefficients of both were positive though neither was significant.[18] This reflects the fact that foreign firms were generally located in industries which were more concentrated. Recent work on foreign

TABLE 10

NEW PLANT CREATION, NEW FIRMS

(N23)

	Canadian Coeff.	(N23C) Signif.	Foreign Coeff.	(N23F) Signif.
Constant	2.91	0.44	- 0.59	0.32
Growth Variables				
GX	- 0.40	0.01	0.018	0.44
GM	0.11	0.57	0.027	0.38
GT	1.00	0.00	0.018	0.22
EXCESS	0.72	0.00	0.025	0.03
Profitability Variables				
PCOMB	- 0.48	0.93	- 0.34	0.69
Barriers to Entry				
ES	- 29.60	0.28	4.59	0.29
RCR	- 8.10	0.22	1.32	0.22
CDR	1.17	0.69	- 0.22	0.64
RD				
AD	- 20.26	0.66	- 16.98	0.02
Other				
REG				
M	7.03	0.19	0.67	0.43
VAR				
Firms				
NC	0.17	0.00	0.004	0.09
NF	0.33	0.00	0.166	0.00
NTD1	- 0.04	0.01	- 0.004	0.10
NTD2	- 0.20	0.00	- 0.005	0.11
R^2	0.87		0.67	
F	65.47	0.00	21.61	0.00
(degrees of freedom)	(14,126)		(14,126)	

ownership (Caves, et. al., [1980]) indicates that the advantages of foreign firms stem from a number of factors, none of which is concentration per se. The most significant determinant of foreign ownership is the multiplant nature of the industry. The inclusion of number of foreign firms should correct for these factors and the fact that both ES and RCR have positive coefficients is weak evidence that foreign firms are not negatively affected by entry barriers as are domestic firms.

For both foreign and domestic firms, the coefficients on the interaction terms NTD1 and NTD2, which catch the effect of advertising and of research and development respectively, on the probability of replacement, are negative. They are both highly significant for domestic entry, but only weakly significant for foreign firms. This supports those who argue research and development and advertising reduces competition -- at least with respect to its effects on entry. But this occurs via their affect on probability of replacement, not via their effect on the limit price.

Entry by domestic firms is positively related to import penetration (M) and weakly significant. While it might be argued that this is a statistical aberration, this does not appear to be the case since a regression of total number of firms on the same set of variables also yields a significantly positive coefficient. Nor is it likely that the positive coefficient can be said to imply that there is something special about Canadian firms in import intensive industries that makes them too numerous and therefore too small. For the coefficient of this variable in the foreign entry equation in Table 10 also has a positive coefficient. Instead, the explanation more likely lies in the fact that in import intensive industries, small firms with differentiated products or small firms that are essentially packaging operations are those that can survive -- whether they be foreign or domestic -- and the standard entry barrier variables do not capture this effect.

The coefficients on total number of firms NC and NF are positive and significant for domestic and foreign entry; however, the coefficient of NC in the foreign entry equation is much less significant than the coefficient of NF in the domestic entry equation. These regressions show Canadian firms replace Canadian and foreign firms but foreign essentially only replace foreign. Moreover the rate of own type replacement, as measured by the coefficient of NC in N23C and NF in N23F is about the same. What is remarkable is that the domestic firm entry rate that depended on the number of foreign firms was at least twice as high as either of the "own" rates of entry.

For domestic entry (N23C), each of the export, and domestic market growth variables has the expected sign. The coefficient on import growth is not significant. Export growth does have a significantly lower impact than domestic sales growth thereby lending credence to the argument that export opportunities require larger firms. Neither EFF (growth where plant size relative to m.e.s. was large) nor MR (growth in high tariff, high concentration industries) were significant. The effect of increases in average large plant size (EXCESS) has the predicted sign and the coefficient is significant.

In contrast, foreign firms respond quite differently from domestic firms to the different sources of growth. None of the export, import or sales variables are significant. Foreign entry is related to EXCESS with the expected sign and the coefficient is significant. This evidence accords both with the suggestion that multinationals are able to respond more readily to the trade liberalization process by rearranging product lines and that their response to rationalization (larger plant size) facilitates the attainment of larger plant size.

(ii) Entry by New Firms Acquiring Existing Plant (N22)

The results for entry by acquisition are presented in Table 11. As with firm entry via plant creation (N23C), domestic entry by acquisition (N22C) is not significantly affected by either plant economies (ES) or residual concentration (RCR) when both are included together. RCR becomes highly significant in the absence of ES. Foreign entry by acquisition (N22F) is positively related to both ES and RCR and both coefficients are highly significant.

The profitability variable has a differential effect in the entry by acquisition category by domestic firms (N22C) as opposed to foreign firms (N22F). The profitability variable (PCOMB) affects acquisitions by domestic firms negatively in a significant fashion as was expected but it does not affect foreign firm acquisitions. This is consistent with the literature that treats multinational investment as depending upon global profit considerations. In this case, domestic measures of profitability should have more of an effect on domestic than foreign firms.

Domestic acquisitions are related to export and import growth variables in the hypothesized fashion. They were not affected by growth in the domestic market. Nor were they affected by changes in

TABLE 11

ACQUISITIONS OF PLANTS, NEW FIRMS

(N22)

	Canadian (N22C)		Foreign (N22F)	
	Coeff.	Sign.	Coeff.	Sign.
Constant	+ 0.72	0.30	- 1.19	0.05
Growth Variables				
GX	+ 0.077	0.00	- 0.033	0.13
GM	- 0.081	0.01	+ 0.031	0.29
GT	+ 0.002	0.89	+ 0.008	0.57
EXCESS	- 0.005	0.66	+ 0.002	0.85
Profitability Variables				
PCOMB	- 2.49	0.01	+ 0.42	0.60
Barriers to Entry				
ES	- 3.72	0.46	+ 10.82	0.01
RCR	+ 1.14	0.36	+ 2.46	0.02
CDR	+ 0.62	0.25	- 0.95	0.03
RD				
AD	- 2.79	0.74	+ 0.21	0.97
Other				
REG				
M			0.77	0.34
VAR			- 0.02	0.26
Firms				
NC	+ 0.010	0.00	+ 0.005	0.02
NF	+ 0.075	0.00	+ 0.149	0.00
NTD1	+ 0.001	0.65	- 0.003	0.16
NTD2	- 0.006	0.11	- 0.004	0.22
R^2	+ 0.57		+ 0.65	
F	+ 15.54	0.00	+ 18.94	0.00
(degrees of freedom)	(13,127)		(15,125)	

average plant size (EXCESS). Export growth and import growth have about the same absolute effect. Foreign entry by mergers (N22F) does not respond in a significant fashion to either domestic or import growth. Export growth has only a weak negative effect. Thus entry by mergers for domestic firms is much more closely related to changes in foreign trade than to domestic opportunities and foreign entry by merger,like foreign entry by plant creation, is basically not affected by growth opportunities.

Neither of the interaction terms (NTD1, NTD2) has the same level of significance as they did for new firm entry by plant creation (N23).

As with the entry by new plant creation process, domestic entry by acquisition (N22C) was related to both the Canadian firm variable (NC) and the foreign firm variable (NF) and the impact of the latter was much greater than the former. The reverse is true for foreign firms. Therefore, whether entry is defined as new firm plant creation or acquisition, movement by domestic firm into foreign sectors was relatively greater than the latter.

D. THE REACTION OF CONTINUING FIRMS TO OPPORTUNITIES FOR EXPANSION

The reaction of continuing firms to expanded markets is expected to depend upon a similar set of variables as that used previously. Tables 12 and 13 present the regression coefficients for the number of continuing firms that built new plants (N13) and the number of continuing firms that acquired existing plants (N12).

TABLE 12

NEW PLANT CREATION, CONTINUING FIRMS

(N13)

	Canadian Coeff.	(N13C) Sign.	Foreign Coeff.	(N13F) Sign.
Constant	- 0.44	0.45	- 0.64	0.18
Growth Variables				
GX	+ 0.050	0.02	+ 0.033	0.06
GM	- 0.013	0.63	- 0.025	0.29
GT	+ 0.031	0.04	+ 0.014	0.22
EXCESS	+ 0.022	0.04	+ 0.006	0.48
Profitability Variables				
PCOMB	- 1.58	0.06	- 1.01	0.12
Barriers to Entry				
ES	+ 1.04	0.81	+ 2.08	0.53
RCR	+ 1.46	0.17	+ 1.49	0.07
CDR	+ 0.20	0.66	- 0.03	0.94
RD				
AD				
Other				
REG				
M			1.41	0.03
VAR			- 0.012	0.32
Firms				
NC	+ 0.018	0.00	+ 0.001	0.53
NF	+ 0.040	0.00	+ 0.074	0.00
NTD1	- 0.542[a]	0.79	+ 0.092[a]	0.95
NTD2	- 0.018	0.00	- 0.001	0.59
R^2	+ 0.74		+ 0.47	
F	+ 34.43	0.00	+ 10.21	0.00
(degrees of freedom)	(12,128)		(14,126)	

Note: a) times 10^{-3}

(i) New Plants by Continuing Firms (N13)

Continuing domestic firms building new plants (N13C) do not react to entry barriers in the same way as do new domestic firms building new plants (N23C). Plant scale economies (ES) has a positive but insignificant coefficient. Residual concentration (RCR) has a positive coefficient that is weakly significant when included with ES but highly significant on its own. Continuing foreign firms also have an insignificant coefficient attached to plant economies (ES) but residual concentration (RC) is positive and significant. The interaction terms NTD1 and NTD2, which catch the extent to which advertising and research and development affect the entry rate, are generally insignificant. Only NTD2 is significant and negative in the equation for N13C - a similar effect for N23C.

Both domestic and foreign firms reduce plant construction as small firm profitability worsens (PCOMB). In this respect domestic firms respond similarly to profitability whether they are entering the industry by acquisition or whether they are already there. On the other hand, continuing foreign firms building new plant (N13F) respond more significantly since the coefficient on PCOMB was not significant for either N23F or N22F. Profitability, therefore, does not affect the entry process for foreign firms but it does influence the decision to expand once the multinational has established a presence.

Foreign and domestic continuing firms respond quite similarly to opportunities arising from trade liberalization. Growth opportunities affect domestic and foreign firms with the predicted signs. However, only the coefficient on export growth is highly significant for both. As with N23, adaptation to import growth comes

TABLE 13

ACQUISITIONS OF PLANTS, CONTINUING FIRMS

(N12)

	Canadian Coeff.	(N12C) Signif.	Foreign Coeff.	(N12F) Signif.
Constant	+ 0.014	0.97	+ 0.17	0.54
Growth Variables				
GX	+ 0.088	0.00	+ 0.022	0.03
GM	- 0.075	0.00	- 0.009	0.46
GT	- 0.019	0.04	- 0.002	0.76
EXCESS	- 0.022	0.00	- 0.002	0.72
Profitability Variables				
PCOMB	- 1.68	0.00	- 0.91	0.02
Barriers to Entry				
ES	- 1.05	0.70	- 0.71	0.72
RCR	+ 0.81	0.22	+ 0.39	0.42
CDR	+ 0.07	0.83	- 0.31	0.14
RD				
AD				
Other				
REG	+ 0.57	0.01		
M				
VAR				
Firms				
NC	+ 0.005	0.00	+ 0.60[a]	0.57
NF	+ 0.026	0.00	+ 0.035	0.00
NTD1	+ 0.008	0.00	- 0.002	0.06
NTD2	- 0.002	0.44	- 0.78[a]	0.62
R^2	+ 0.78		+ 0.46	
F	+ 40.40	0.00	+ 11.00	0.00
(degrees of freedom)	(13,127)		(12,128)	

Note: a) times 10^{-3}

neither from significantly less new firm plant creation nor from significantly less continuing firm plant creation. Domestic firms (N13C) do respond as predicted to both GT and EXCESS in a significant fashion; but foreign firms (N13F) do not have a significant variable on either. Thus foreign firms, whether they be entrants that create new plant (N23F) or continuing firms that create new plant (N13F) respond more to export opportunities than domestic growth opportunities.

As with the new firm entry process, there is a different turnover response for domestic as opposed to foreign continuing firm new plant creation. When the total number of firms is split into its two components (NC, NF) the coefficient of N13C on NC is .018 but on NF .04; the coefficient of N13F on NC is not significant while it is .07 on NF. Once again, the difference between the two equations stems from the lack of replacement by foreign firms of domestic firms. In addition, domestic firms are creating plant at twice the rate in response to foreign firms than they are in response to domestic firm presence.

Finally, the only interaction term that is significant is NTD2 in N13C. Thus for both domestic new and continuing firms, there is less plant creation where research and development is more important. In contrast, advertising may reduce the rate of domestic new firm plant creation (N23C) but it does not affect domestic continuing firm plant creation (N13C).

(ii) Acquisitions of Plants by Continuing Firms (N12)

The influences that determined the tendency of continuing domestic firms to merge were very similar to those that led to the acquisition of existing plant by new domestic firms. This suggests that at least in the context of the entry model, domestic horizontal mergers and diversification across four digit industry classes responded to similar influences.

For instance, horizontal mergers by domestic firms (N12C) is negatively related to both plant economies (ES) and positively related to residual concentration (RCR) but neither are significant when included together although RCR is highly significant when included on its own. This is also the case for mergers by outsiders (N22C). Again horizontal mergers (N12C) like mergers by outsiders (N22C) is negatively related to PCOMB and is highly significant. Finally, domestic horizontal mergers (N12C) like N22C is significantly related to export growth (GX) and positive; it is negatively related to import growth and significant. Thus, both the conglomerate and horizontal merger process is very much related to trade growth.

One major difference between the two equations lies in the positive coefficient with a significance level of 1 per cent attached to the regional dummy in the domestic firm horizontal mergers regression (N12C). Horizontal mergers by domestic firms tended to be more heavily concentrated in regional industries than mergers related to diversification. Another difference is that continuing firm mergers are negatively related to domestic sales growth and to the EXCESS variable that captures changes in average firm scale. Thus domestic horizontal mergers are greater where there is less growth and a larger increase in MES, thereby suggesting rationalization as a basic motive for such mergers.

The similarity in the merger process observed for domestic firms does not extend to the foreign category where there are a relatively small number of similarities. A comparison of horizontal mergers by foreign companies (N12F) and mergers by outside foreign firms (N22F) reveals a number of differences. Horizontal mergers (N12F) are negatively related to plant economies (ES), in a significant fashion when RCR is removed; in contrast conglomerate mergers (N22F) has a significantly positive coefficient on ES. Residual concentration (RCR) does not affect N12F whereas it had a significant positive effect on N22F. Both of these results suggest horizontal mergers are not heavily concentrated in concentrated markets. Once again continuing foreign firms (N12F) respond to PCOMB as did N13F but entrants by merger (N22F) as entrants by plant creation (N23F) did not. Neither foreign horizontal mergers (N12F) nor conglomerate mergers (N22F) respond significantly to import growth (GM). Export growth (GX) does result in more horizontal mergers (N12F) while mergers by outsiders (N22F) was negatively related to export growth. Thus, it is horizontal mergers that respond to or create the larger firms that are posited to be a requirement for export growth.

Instead of comparing the conglomerate as opposed to the horizontal merger process, the horizontal process can be examined for differences between the domestic and foreign sector (N12C as opposed to N12F). Several significant differences emerge. First, domestic horizontal mergers are positively related to the regional dummy variable and foreign horizontal mergers are not. Secondly, as with the plant creation process for continuing firms (N13), the domestic continuing plant merger process depends upon both domestic and foreign firms, the foreign process depends only on foreign firms. Once again, the rate of domestic plant mergers that depends upon foreign firms is much larger than that which depends upon domestic firms. Finally the coefficient for both N12C and N12F attached to NF is about the same.

In summary, the merger process for outsiders and insiders appears to be very similar for domestic firms; it is less so for foreign firms.

E. RELATIVE IMPORTANCE OF NEW FIRMS AS OPPOSED TO CONTINUING FIRMS

The individual entry equations possess certain broad similarities. Therefore two additional regressions were estimated to examine the factors determining the relative number of new as opposed to continuing firms that created plant or made acquisitions. The dependent variable in the first case (BRTH13) is the number of continuing firms that created new plant over the total number of firms that built new plant [(BRTH13 = N13/(N13 + N23)]. The dependent variable in the second case (ACQ12) is the number of continuing firms that acquired plant over the total number of firms that acquired plant [(ACQ12 = N12/(N12 + N22)]. The previous sections have shown sufficient similarities between the domestic and foreign relationships in each entry category to justify estimating these relationships only for total number of firms. The regressions using each of these dependent variables are intended to highlight the differences between the effect of the independent variables on new as opposed to continuing firms. Table 14 presents the results.

In the regression explaining the relative tendency to create

TABLE 14

THE RELATIVE SIGNIFICANCE OF CONTINUING AS OPPOSED TO NEW FIRMS

	BRTH 13		ACQ 12	
	Coeff.	Signif.	Coeff.	Signif.
Constant	0.08	.23	.35	.00
Growth Variables				
GX				
GM			- 0.007	0.04
GT			0.000	0.57
EXCESS				
Profitability Variables				
PCOMB	0.12	.25	- 0.02	0.88
RG6	0.04	.24	- 0.02	0.77
CVAR				
Barriers to Entry				
ES	0.906	.00	- 0.50	0.16
CDR			- 0.08	0.14
RCR	0.235	.03		
RD	- 0.061	.63	- 0.19	0.17
AD	- 1.390	.12		
VAR	- 0.006	.001		
REG				
R^2	.09		.12	
F	3.04	.005	3.45	.002
(degrees of freedom)	(7,130)		(8,120)	

new plants, the two scale variables are significant - ES, and RCR. Continuing firms then are more likely than new firms to create new plant when both plant scale (ES) residual concentration (RCR) is higher. But these firm level economies do not relate to advertising (AD) since the latter has a negative sign which is not very significant. New firms are less likely to create new plant when the variance of sales (VAR) is high. This suggests continuing firms partially adapt to cyclicality by expanding existing plant, an option not available to new firms. Since so few variables are significant, this confirms the earlier observation that there is little to distinguish these two forms of plant creation except their reaction to entry barriers. This suggests the entry data (N23) describes not so much entry as plant creation and that insiders and outsiders respond basically to the same forces though in differing degrees depending upon the barrier variables.

The second category (ACQ12), using number of insiders making acquisitions over total number of firms making acquisitions, also confirms similarities in the determinants of acquisitions made by insiders as opposed to outsiders. The only strongly significant variable is import growth (GM) with a negative sign. ACQ is also negatively related though less significantly to the importance of plant economies (ES); to the relative labour productivity of small as opposed to large firms (CDR), and to the importance of research and development (RD). Here entry barriers favour outsiders making acquisitions.

F. SUCCESS AS MEASURED BY SHARE

The importance of entry to the competitive process depends upon more than just the number of new firms. Most of the entry studies referenced earlier have focused on the number of entrants. However, the use of numbers of firms as dependent variable may give too much weight to small firms since this procedure ignores the size of entering firms. In order to investigate whether the same entry barriers affected success of entrants, as measured by size and numbers, the relative shares of each category, new firms, new plants (SH23); new firms, acquired plants (SH22); continuing firms, new plants (SH13); continuing firms, acquired plants (SH12) were used as dependent variables.[19] The results are reported in Table 15, for a subset of what were the more significant variables.

These results were obtained using ordinary least squares for all 141 non-miscellaneous industries, irrespective of whether there is a positive level of entry or exit. Since the dependent variable is bounded by zero and one, a limited dependent variable approach such as that provided by a logit transformation may be more appropriate -- both because the predicted value may be more likely to be within the bounds specified and because the error terms from such a regression may more closely satisfy the requirements for BLUE estimates of the coefficients. Therefore a logit estimation of the share equation, was estimated for all non-zero observations. Ln[SH/(1-SH)] was the dependent variable. Weighted least squares was employed to reduce heteroscedasticity (Theil [1970]). A comparison of the logit estimates to the OLS revealed few significant differences.

Although using ordinary least squares across the entire sample (including zero observations) as opposed to the logit technique for only non-zero observations makes little difference, it still may be the case that zero and non-zero observations should be treated differently. If so, a maximum likelihood technique could be used that allows for the joint estimation of the determinants of when entry (exit) becomes positive and the amount of entry (exit) once it becomes non-zero. A rough test of whether there is a different relationship was obtained by using ordinary least squares across the whole sample and across just the non-zero observations. Except for the category of foreign mergers there was little difference. The differences in the foreign merger categories may have resulted from the operation of the Foreign Investment Review Agency. The determinants that influenced whether the Agency would permit foreign mergers would not necessarily have been the same as the determinants of the amount of mergers that would be undertaken once approved by FIRA.

The results for the OLS estimations are reported in Table 15. As measured by market share in 1979, new firms that built plant (SH23) were relatively less successful where plant economies (ES) were important and where residual concentration (RCR) was high. As with N23C, plant economies and those factors other than plant scale that determine concentration deterred the creation of new plant by new firms. However, these variables are much more significant in the share equation. The other major impediment in SH23 is foreign ownership (FO) though this variable may just be catching advertising and research and development barriers.[20] Research and development has a negative effect on SH23. It is weakly significant when FO is included but becomes highly significant in the absence of this variable.

TABLE 15

THE RELATIVE SHARE OF ENTRY AND ACQUISITION CATEGORIES

	SH23		SH13		SH22		SH12	
	Coeff.	Sign.	Coeff.	Sign.	Coeff.	Sign.	Coeff.	Sign.
Constant	132.19	0.000	25.06	0.28	29.79	0.52	34.92	0.03
Growth Variables								
GX	-1.69	0.21	-	-	-	-	0.73	0.25
GM	-2.52	0.11	-	-	-	-	-	-
GT	3.80	0.00	-	-	-	-	-	-
EXCESS	2.64	0.00	-	-	-	-	-	-
Profitability Variables								
PCOMB	-43.57	0.44	-51.79	0.11	-21.41	0.76	15.20	0.56
RG6	66.13	0.00	11.58	0.32	22.96	0.36	-10.06	0.33
PNEG	-	-	271.91	0.03	-	-	-	-
CVAR	-	-	-11.23	0.33	-	-	-	-
Barriers to Entry								
ES	-397.15	0.05	-39.37	0.78	264.52	0.35	-	-
CDR	-	-	26.09	0.13	34.12	0.36	-11.39	0.30
RCR	-159.68	0.01	8.95	0.80	156.58	0.04	-	-
RD	- 87.17	0.19	-	-	-	-	-59.07	0.10
CA	- 31.00	0.06	-	-	-	-	-	-
VAR	6.38	0.00	-1.03	0.07	0.26	0.83	-	-
REG	-	-	-	-	-	-	26.21	0.02
FO	- 59.95	0.09	16.47	0.40	-	-	20.85	0.23
R^2	0.44	-	0.04	-	0.06	-	0.06	-
F	10.28	0.00	1.58	0.13	2.43	0.03	2.36	0.027
(degrees of freedom)	(12,128)		(9,131)		(6,118)		(7,133)	

The share of new firms that entered via acquisition (SH22) is positively related to plant economies (ES) and to residual concentration (RCR) though only the latter is significant. This is a process that was present for N22F though not for N22C. Thus the share of new actors in an industry depended more heavily upon acquisition rather than the creation of new plant by outsiders.

The small firm profitability variable PCOMB is negatively related to both SH23 and SH22 though only weakly significant for N22 not significant for either. Both SH23 and SH22 are positively related to profit growth (RN6) - the former significantly so. While there was a positive coefficient for this variable in both N23C and N22C, it was so insignificant that it was omitted from the results reported previously. Since share is jointly determined by relative number of firms in a category and relative size, this suggests profitability growth positively affected both. Higher profitability allowed more firms and larger firm size.

The other major difference between the numbers equations and the share equations lies in the effect of the growth variables. These were generally significant determinants in the N23C, N23F, N22C, and N22F equations. In SH22, these variables have no significant effect on the share equations for new firms. Thus the effect of growth on numbers of firms must be offset by an opposite effect on relative size. Market growth allows more firms to enter by acquisition and those firms, that do so, to enter at relatively smaller size. SH23 shares with N23 significant coefficients on GT and EXCESS but in contrast does not have a significant coefficient on GX. Thus exports do not have a differential effect on share of entrants building plants though they did on numbers. Together these results imply that exports lead to larger average sized plant.

That growth in market size had a positive effect on firm size and profit growth a positive one is of some interest. Both accord with the commonly held notion that growth facilitates the entry by firms closer to optimal size. It also has implications for the limit entry pricing literature. Masson and Shaanan (1982) suggest the sign growth should have in determining the limit entry price is non-positive but find it to be only weakly negative. The results found here do not support this. For if growth and larger size are positively related, prices must be higher to facilitate larger scale entry.

The share of new plants created by existing firms (SH13) is not well explained by the same set of variables that proved useful for SH23. The cyclicality variable (VAR) has a negative sign and is significant. Thus cyclicality leads to more new firm plant creation but less continuing firm plant creation. The only variable that is highly significant is the proportion of small firms reporting negative profitability (PNEG). Stonebraker (1976) hypothesized that this variable affected entry. The results reported here show that it does not negatively affect new plant creation, as measured by share, but it does increase the share of continuing firm new plants.

The final variable, the share of acquired plants by continuing firms (SH12), is least related to entry but is reported primarily for comparison to the entry by acquisition (SH22) category. In contrast to the case where numbers of acquisitions were used, there is little in common between the internal and external acquisition process when relative shares are used as the dependent variables. In the share equation for new entrants acquiring plants (SH22), the residual concentration variable (RCR) is positive and highly significant. In contrast the same result does not hold for the share of plants acquired by continuing firms (SH12). The only highly significant variable in SH12 is the regional dummy variable which has a positive effect. The cost disadvantage ratio (CDR) has a negative coefficient that is weakly significant. Both the fact that horizontal mergers are greater where small firms are less productive than large, the positive coefficient attached to PCOMB and the negative coefficient attached to the profit growth variable (RG6) catch that part of the horizontal merger process that is related to defensive rationalization.

Finally, it should be noted that the share equations are all less significant than the equations that looked at entry in terms of number of firms. While SH23 is still significant at the 1 per cent level, none of the other equations are. Success of entry as measured by share captured is more inherently difficult to explain than success as defined in terms of numbers.

G. RELATIVE AVERAGE SIZE

That the determinants of the relative share of new firms creating new plant are not as significant as the determinants of new firm entry should not be surprising. The share variable is the product of the probability of entry times the ratio of the average entrant's size to the average size of existing firms.

$$SHAR\ 23 = \frac{N23}{N} \cdot \frac{S23}{SN}$$

where N23/N proportion of firms as of 1979 accounted for by new firms creating new plant (the probability of entry).

S23 the average size (sales) of entrants creating new plant

SN the average size (sales) of all firms that existed in 1979.

The entry equations that have already been reported essentially indicate the variables that should determine the probability component N23/N. Equally interesting are the determinants of the relative size of entrants -- S23/SN. A regression using the average size of new firms creating new plants divided by the average size of continuing firms was estimated using the same set of variables that were found to determine the ratio of Canadian large firm size to minimum efficient sized plant (Baldwin and Gorecki, 1982). This is reported in Appendix A. The results were uniformly weak. The adjusted R^2 was .04 and the F statistic was significant only at the 20 per cent level. The only variable that was significant was concentration -- with a negative coefficient and a significance level of .06.

Instead of comparing the size of entering and exiting establishments by new or dying firms to the size of all continuing establishments, the question of relative ease of entry or exit can be addressed by comparing the size of establishments of new or dying firms to that of continuing firms in the same category. Two such variables were examined.

S23/S13	the ratio of the average size (sales) of new firms that built new plant to the average size of continuing "firms" that built new plant
S34/S14	the ratio of the average size (sales) of dying firms that scrapped plant to the average size of continuing "firms" that scrapped plant

The independent variables were the same as were previously used in the entry equations -- representing growth, barriers to entry and profitability.

In the case of both new and scrapped plants, there is virtually no explanatory power to the variables chosen. For S23/S13, RD is negative and significant at the 6 per cent level. Thus high research and development intensity allows entrants to create plant that is small in relation to the plant being created by continuing firms. Growth does not affect the dependent variable; nor do any the entry barrier variables besides R&D. For S34/S14, residual concentration is highly significant with a negative sign but nothing else is. Thus where concentration is high due to factors other than plant scale, the scrapped plant of dying firm is smaller than that of continuing firms.

This suggests that relative numbers rather than relative shares is the appropriate variable to investigate. Relative numbers appear amenable to explanation but relative size does not. Thus relative shares, which are just the product of relative numbers times relative size, suffer from the disadvantage not only that they compound two effects but also that one of those variables (relative size) is not closely related to the standard set of variables used in an entry model.

H. NEW PLANT PERCENTAGE OF GROWTH

An alternate way to measure the success of entry is to use a variable that measures the extent to which growth came from new plants. It is this variable, along with the rate of growth of average firm size, that the stochastic growth literature (e.g. Simon and Bonini [1958]) derives as the determinant of the equilibrium distribution of plant sizes. Thus the following dependent variable was used.

SHARPLANT	The sales in 1979 of all newly constructed plants whether owned by new firms or continuing firms divided by the change in industry sales, 1970-79.

Table 16 presents the results of the regression using this dependent variable. New plant share of industry growth was negatively related to residual concentration (RCR) and plant scale (ES) and highly significant. It is also negatively related, though the relationship was weaker, to advertising in consumer good industries (AD). The coefficient on relative small firm labour productivity (CDR) was positive and significant. The coefficient on variation of profitability (CVAR) was negative though only weakly significant. Again this suggests the forces that encourage or discourage small firms have the same effect on new plant creation. In the same vein, the variable that attempts to capture the relative profitability of small firms (PCOMB) is negatively related to the dependent variable. The percentage of small firms reporting negative margins in 1970

TABLE 16

SHARE OF GROWTH ACCOUNTED FOR BY NEW PLANTS

	Coeff.	Sign.
Constant		
Growth Variables		
GX		
GM		
GD		
EFF		
MR		
Profitability Variables		
PB		
PCOMB	- .14	0.08
RG3		
RG6		
PNEG	+ 1271.50	0.01
CVAR	- 0.06	0.16
Barriers to Entry		
ES	- 8.18	0.02
CDR	+ 20.56	0.03
RCR	- 3.82	0.00
RD	- 1.40	0.32
AD	- 843.30	0.39
Other		
VAR	9.47	0.00
REG		
R^2	.27	
F	7.03	0.00
(degrees of freedom)	(9,131)	

(PNEG) has a strong positive influence on share of new plant growth. Finally, the variability of industry sales (VAR) has a positive impact upon the share of growth accounted for by new plants. Variability thus led to adaptation by new plant as opposed to the expansion of existing plants even though it had a negative influence upon BRTH13.

I. SUMMARY OF THE ENTRY PROCESS

Earlier work on the entry process in Canada (Orr [1974]), using net entry during a span of four years in the 1960s, determined that incentives to entry such as profitability and growth had little effect but that barriers to entry had a significantly negative impact on entry. Expanding on Orr's work, Gorecki [1975] concluded that foreign and domestic firms acted in quite different ways. Canadian firms only weakly responded to such incentives as profitability and growth but reacted strongly to barriers. Foreign controlled firms responded in exactly the opposite fashion -- strongly to incentives but only weakly to entry barriers.

This paper demonstrates that the same generalities cannot be drawn for the decade of the 1970s when gross entry by new firms (N23) is used as the dependent variable and when the number of explanatory variables is increased. Domestic firms creating new plant did not react more significantly to the profit variable but did to the growth variables. While plant scale barriers negatively affected domestic firms, they were not significant. On the other hand, one barrier variable (RCR) tended to increase foreign entry. This suggests that barriers of the traditional variety may have had a different effect but not a detrimental one. Moreover both advertising and research and development reduced the rate of entry for both domestic and foreign new firms.

The major difference between new foreign and domestic controlled firms that created new plant can be found in the response of each group to the growth resulting from trade flows. Canadian firms that created plant (N23C) responded significantly to export, and domestic market growth in the expected fashion. But foreign firms that created plant (N23F) responded only to export growth and then only weakly. New foreign firms primarily created plant in response to export growth. This result suggests that multinational firms were building plants in Canada as part of their worldwide operations and that such plants were aimed at exports. The lack of effect of the import growth variable for both foreign and domestic firms suggests that the multinationals are no more able to respond to import growth by making adjustments in product lines than Canadian firms. On the other hand, Candian firms are much more sensitive to domestic growth.

The adjustment process to changes in foreign trade for continuing firms is somewhat the same. N13C increases with export growth as does N13F but is not as significantly affected by import growth. Once again, domestic firms respond more to domestic market opportunities than do foreign firms. This, at least, suggests that continuing domestic firms are no more affected than foreign firms. Moreover, it suggests that continuing domestic firms are just as able to take advantage of export opportunities.

Examination of the coefficients on domestic and export growth for entry by Canadian controlled firms via the creation of new plant also bears out the prediction that trade liberalization brings with it larger average firm size. The coefficient on export growth is significantly less than that of domestic growth thereby suggesting that a shift from domestic to export sales brings with it a decrease in number of firms and, ceteris paribus, an increase in average firm size. The same result does not hold for continuing firms (N13). Here the export coefficient is significantly larger than the domestic sales coefficient. Thus continuing firms create more plants for export growth than for domestic growth.

The equation that deals with acquisitions by continuing firms (N12) reaffirms the nature of the rationalization process that accompanies the trade liberalization process. Here the effects of imports and exports on domestic acquisitions, while opposite in sign are about equal. But they are significantly greater than the effect of growth of domestic sales. Thus it might be said that horizontal mergers are the route used to produce the larger firms that are necessary for an adaptation to increased trade liberalization.

This study also allows comparison of the differences in the forces that lead to plant creation by continuing firms (N13) as opposed to new firms (N23). The foreign controlled plant creation process was broadly similar in that most coefficients had similar signs. Differences can be found in the significance attached to the coefficients. New firms reacted more significantly to advertising as a barrier, continuing firms more significantly to profitability and growth. However, the plant creation equations contained more differences for continuing and new domestic firms (N13C and N23C respectively). Continuing firms reacted positively to residual concentration while new firms responded negatively. Nevertheless, the reactions of the whole sample -- both domestic and foreign -- were sufficiently similar that in the regression of BRTH13 (N13/N23+N13), only residual concentration (RCR), plant scale (ES), and the variances of sales (VAR) were significant. Thus plant creation, whether by new firms or continuing firms, responded quite similarly to the independent variables.

The two acquisition processes also showed considerable similarities -- at least when measured by number of firms (N22 and N12). Domestically controlled firms making acquisitions, whether they were new to the industry (N22C) or continuing (N12C), generally responded in a significant fashion to the same variables. While there were some similarities for foreign controlled firms between N22F and N12F, there was a major difference in the plant scale economies, export growth, profitability, and advertising interaction variables. However, even with the differences on the foreign side, there were substantial similarities overall as was shown in the regression of relative numbers in each acquisition category (ACQ12).

Perhaps the greatest differences are evident when the importance of each category is measured by share of industry sales as of 1979 (S22, S12). Entry by acquisition when measured by market share (S22), was relatively more important where residual concentration was high. Thus, while the number of domestic continuing firms making acquisitions (N22C) was negatively related to scale of plant barriers the number of acquisitions in industries with low concentration was not large enough to offset the size effects of acquisitions in highly concentrated industries and share (S22) was larger in the latter. On the other hand, the share of acquisitions by continuing firms (S12) was not positively related to concentration -- thereby suggesting that horizontal mergers were not contributing in an obvious fashion to higher concentration where it was already so high as to create competition problems.

J. THE EXIT PROCESS

While the entry process has received little attention in applied studies, the exit process has received even less. Nevertheless, those few studies that exist (Mansfield [1962], Marcus [1967], Caves and Porter [1976]) suggest that the forces that determine the exit process can be catalogued in much the same fashion as those for entry. In this paper, exit is hypothesized to occur as a result of changes in the size of the industry, from lower than normal profits, and as a result of a replacement process due to the entry of new firms. Thus exit can be taken to be a function of the same set of variables that affected entry-growth variables, profitability and entry barrier variables, and the total number of firms.

Exit should be positively related to the total number of firms in the industry for the same reason that entry was. There is a difference between the entry and exit equations with respect to the firms variable used. In the exit equations, the number of existing foreign firms as of 1970 is used in the foreign firm equation, and the number of existing domestic firms as of 1970 in the domestic firm equation -- since the number of exits in a category comes from the firms in that category. In contrast, the entry equations use both domestic and foreign existing firms for each of the domestic and foreign entry equations because an entrant could replace either a domestic or a foreign firm.

The firm variable in the exit equation will also catch what is characterized as the rationalization process. Existing firms will die not only because they are replaced by new firms but also because existing firms expand and take away their markets. To the extent the latter effect follows a random process similar to that posited for entry, this part of exit will also be a function of the number of firms. However, because the coefficient on number of firms in the exit equation is made up of both effects, it should be larger than that in the entry equation.

(i) Exit Via Scrapping (N34)

The regression results for number of firms that exited by scrapping plant are reported in Table 17. For the domestic category (N34C), both the export and the domestic growth variable affects exits with the expected sign and are highly significant. Import growth is highly significant and it has an unexpected negative influence. The variable EXCESS has the expected sign and is highly significant indicating that domestic exits, like domestic entrants, responded to increases in scale of plant.

For the foreign exit category, only imports have a significant coefficient -- and again it is unexpectedly negative. Neither exports nor domestic growth are significant. As with entry by new plant creation (N23), this is indicative of very different responses between domestic and foreign controlled firms to trade liberalization.

TABLE 17

EXIT BY FIRMS SCRAPPING PLANT

(N34)

	Canadian (N34C)		Foreign (N34F)	
	Coeff.	Sign.	Coeff.	Sign.
Constant	3.12	0.41	0.98	0.08
Growth Variables				
GX	- 0.19	0.19	- 0.005	0.82
GM	- 0.44	0.01	- 0.046	0.08
GT	- 0.27	0.01	- 0.003	0.80
EXCESS	- 0.35	0.00	- 0.017	0.13
Profitability Variables				
PCOMB	4.72	0.39	- 0.31	0.73
Barriers to Entry				
ES	- 22.28	0.43	- 3.18	0.45
CDR	1.46	0.62	- 0.38	0.43
RCR	- 8.72	0.21	- 2.03	0.06
RD				
AD				
Other				
REG				
M				
VAR				
Firms				
NC	- 0.400	0.00		
NF			0.238	0.00
NTD1*	- 0.087	0.00	- 0.096	0.00
NTD2*	0.226	0.00	- 0.005	0.77
R^2	0.96		0.76	
F	316.82	0.00	41.82	0.00
(degrees of freedom)	(11,129)		(11,129)	

Note: * These interaction terms were calculated with NC for N34C and NF for N34F.

Domestic and foreign exits differ not only with respect to the incentives provided by growth but also with respect to the effect of profitability. As small firm profitability worsens, domestic exits (N34C) increase -- though this variable is not significant. Foreign firm exits (N34F) do not react to the profit variable with even the correct sign. Thus the profit variable (PCOMB) has little influence on either new firm new plant entry (N23) or exit via scrapping (N34).

Turning to the barriers variables, there is some evidence to suggests exit may also be affected detrimentally by the same variables that reduce entry. Domestic exits (N34C) and foreign exits (N34F) are both negatively related to residual concentration (RCR). The variable is highly significant for N34F but is only weakly significant for N34C irrespective of whether ES is excluded. The plant scale variable (ES) does not have a significant negative effect in either equation. All this suggest that barriers to exit may exist similar to those for entry (Caves and Porter [1970]) -- but that it lies primarily in firm level not plant level economies.

The same interaction variables of advertising and number of firms (NTD1); research and development and number of firms (NTD2) also were included in the exit equations. Exits in both categories were negatively related to the advertising interaction variable (NTD1). Thus while NTD1 negatively affected entry, it had the same effect on exits. In contrast research and development (NTD2) did not have a negative impact in the domestic exit equation as it did in the entry equation. It was positive and significant in the domestic equation. Thus research and development would have led to increasing concentration in the domestic sector. The research and development interaction term does not affect either foreign entry or exit.

The coefficients on existing number of firms (NC, or NF) in each of the domestic and foreign equations are larger than those in the entry equations on the same variable - but particularly so for domestic firms. This suggests the random process associated with number of firms that determines exit is much more significant than for entry -- entry depends on a number of factors whereas a different force -- represented by number of firms -- is the prime determinant of exit. This accords with Table 9 which showed little relationship between exit rates and growth.

(ii) The Scrapping of Plant by Continuing Firms (N14)

In order to contrast the process that leads to exit via scrapping of plant with the factors that lead continuing firms to terminate plant, the number of the latter was regressed on the same set of independent variables. The results are reported in Table 18 for both domestic and foreign controlled firms. The incentive variables do not perform well. The profitability variable (PCOMB) has the opposite sign to that which was predicted and the export and import, growth coefficients have the wrong signs. Growth from increased exports and domestic sales was accompanied by more not less exits suggesting that continuing firms were rationalizing product lines and plant size.

Since the effect of the growth variables was perverse a test was run for non-linear effects of growth both in this equation and others. Total growth, appropriately deflated by m.e.s., (GT) along with the variable, growth when negative (GTN), were used and a dummy

TABLE 18

CONTINUING FIRM SCRAPPING OF PLANT

(N14)

	Canadian (N14C)		Foreign (N14F)	
	Coeff.	Sign.	Coeff.	Sign.
Constant	0.56	0.36	- 0.44	
Growth Variables				
GX	0.150	0.00	0.049	0.03
GM	- 0.118	0.00	- 0.032	0.08
GT	- 0.043	0.01	- 0.007	0.47
EXCESS	- 0.056	0.00	- 0.018	0.02
Profitability Variables				
PCOMB	- 2.28	0.01	- 1.11	0.08
Barriers to Entry				
ES	- 0.87	0.84	3.09	0.30
CDR	0.23	0.63	- 0.21	0.54
RCR	1.07	0.34	1.91	0.01
RD				
AD				
Other				
REG				
M			0.51	0.05
VAR			- 0.01	0.21
Firms				
NC	0.009	0.00		
NF			0.080	0.00
NTD1*	0.009	0.00	0.028	0.09
NTD2*	- 0.139[a]	0.97	- 0.004	0.72
R^2	0.71		0.56	
F	32.16	0.00	14.64	0.00
(degrees of freedom)	(11,129)		(13,127)	

Note: *) these interaction terms were calculated using NC for N34C and NF for N34F.

a) times 10^{-3}

variable equal to 1 when growth was negative (DUMG) was added. These three variables along with those previously used were included in each regression. The coefficients on DUMG, GTN, and GT when they are included together are reported in Table 19. The coefficient for DUMG when included alone is also reported in this table.

The results bear out the earlier conclusion of aberrant behaviour in the exit categories of N34C, N14C and N14F. In the entry category, when DUMG alone is included, it is only weakly significant for N23F. Thus the previously estimated relationships hold for the entry categories except for new plant creation by foreign firms where negative growth shifts the relationship down. In the exit category, only N14 has a weakly significant coefficient on DUMG. But contrary to expectations, it is negative. That is exits are lower on average where a priori, we would expect them to be higher. When both the intercept slope dummy and negative growth are included, the intercept takes on a positive value but the slope coefficient, contrary to expectations, is positive and highly significant for N14C and weakly significant for N34C and N14F. Thus in those industries where sales fell most, exit was least. Exit barriers of a peculiar nature were functioning in declining industries. Those with moderate decreases in demand functioned as one would expect; but those that were most in need of adaptation because of declining demand appeared to be least able to adapt.

Barriers to entry do not have the same effect on continuing firm plant scrapping (N14) as they do on firm exits (N34). In the latter category, there was a tendency for residual concentration to decrease exits. For continuing firms, scrapping is positively related

TABLE 19

THE EFFECT OF NEGATIVE AS OPPOSED TO POSITIVE GROWTH

	DUMG						DUMG	
	INTERCEPT		MESMSTN		MESMST		ALONE	
	Coeff.	Signif.	Coeff.	Signif.	Coeff.	Signif.	Coeff.	Signif.
N23C	- 9.01	.20	- 2.14	.43	0.55	.00	- 5.19	.31
N23F	- 1.53	.27	- 0.66	.89	- .002	.45	- 1.64	.13
N22C	1.62	.89	0.24	.52	.002	.89	- 0.59	.71
N22F	- 1.53	.33	- 0.47	.32	.004	.86	- 0.46	.55
N12C	- 0.21	.83	0.09	.69	- .014	.22	- 0.05	.54
N12F	0.09	.92	- 0.02	.86	.006	.52	- 0.20	.70
N13C	- 0.64	.53	- 0.38	.25	.032	.08	0.15	.84
N13F	- 0.07	.95	- 0.17	.66	.005	.85	- 0.51	.60
N34C	3.98	.43	2.59	.18	- .049	.56	- 0.71	.84
N34F	- 0.24	.83	0.27	.48	.016	.22	0.35	.63
N14C	0.79	.51	0.87	.02	- .004	.82	- 1.18	.17
N14F	0.89	.27	0.36	.14	- .005	.62	0.01	.98

Notes: 1) Intercept is shift coefficient for negative growth

2) MESMST is growth

3) MESMSTN is growth when negative

to residual concentration. It is highly significant in the foreign category. It is weakly significant for domestic firms when the regression is estimated across the whole sample but highly significant when only non-zero observations on the dependent variable are used. Thus, it may be concluded that plant and firm barriers, if they work, may reduce exit rates at the firm level, but they do not affect the ability of continuing firms to rationalize their plant structure.

The interaction term NTD1, which measures the effect of advertising has a similar sign both for domestic and foreign continuing firm scrapping. Scrapping rates are positively related to the advertising interaction variable. This variable had no significant effect on new plant creation by continuing firms in both categories (N13). Thus advertising has the effect of causing more plant scrapping and but it does not affect plant creation by continuing firms. Ceteris paribus, this would have contributed to increases in the average scale of existing firms. NTD2 (the research and development interaction) does not significantly affect N14C and N14F but it reduced new plant creation by continuing firms (N13C, N13F). On the other hand it reduced new firm entry (N23C) and increased firm exit (N34). Thus research and development would also contributed to plant scale enhancement but at the same time, it would have increased concentration.

The number of continuing firms as of 1970 is significantly related to scrapping for both foreign and domestic continuing firms. However the coefficient for foreign firms is some eight times as large as that for domestic firms. This coefficient can be interpreted as the degree to which rationalization is occurring irrespective of all other influences that are being accounted for in the other variables. Thus foreign continuing firms would appear to be responding more readily to this process -- though they are exiting at a lower rate as was evidenced by the smaller coefficient in the N34 equation. Thus the adaptation process resulted in a larger number of domestic as opposed to foreign firm exits but greater foreign than domestic continuing firm plant scrapping.

K. FINDINGS ON THE EXIT PROCESS

There are significant differences between the plant death process for continuing as opposed to exiting firms. First, exit by domestic firms (N34C) is less likely when export and domestic growth are high. These variables capture the state of well-being as expected. In contrast, the same growth variables have unexpected signs in the equations for continuing firms, both domestic and foreign (N14C and N14F), that scrap plant. Here domestic and export growth leads to more scrapping, not less.

This is the result of a differential effect of negative and positive growth rates on the exit process that is particularly important for continuing domestic firms (N14C) but that also exists for exiting domestic firms (N34C). In each of these categories, positive growth indeed reduces exits (although the effect is relatively insignificant); but the greater the negative growth, the less exits there are.

The two processes also differ in the extent to which concentration affects exit. In neither case do plant economies have a significant effect upon exit. Residual concentration has a weak negative effect on exits (N34) but it has a positive and sometimes significant effect on the scrapping of plant by continuing firms (N14). If there is a barrier to exit, it lies at the firm not the plant level. Firms may be discouraged from completely leaving where concentration is high but they are not discouraged from scrapping plant.

There is also a difference in the effect that relative small firm profitability (PCOMB) plays in the two processes - at least for domestic firms. It is positive though not significant for exiting Canadian firms (N34C). It has a significantly negative coefficient for continuing domestic firms that scrap plant (N14C).

In summary, the scrapping process cannot be said to respond similarly to the same variables. This is in marked contrast to the conclusion drawn in the earlier section on entry. There it was noted that plant creation whether it was by new or continuing firms responded quite similarly.

The exit equations also indicate that domestic and foreign firm exits (N34) respond quite differently to certain of the "opportunities" variables. Domestic firms are affected by the growth rate of exports and domestic sales while foreign firms are not. While residual concentration affects both negatively, it is more significant for foreign firms. In addition, while turnover rates are negatively related to advertising and highly significant for both domestic and foreign firms, they are positively related to research and development in a significant fashion only for domestic firm exits (N34C) and not for foreign firms (N34F).

While exits via scrapping (N34) differs for foreign and domestic firms, this is not the case for the scrapping of plant equations by continuing firms. Here the response of domestic and foreign firms is generally similar -- the signs of the significant coefficients are the same.

L. RELATIVE NUMBERS AND SHARES OF EXITING CATEGORIES

In order to investigate further the differences between exiting firms that scrapped plant and continuing firms that did the same, a new variable was constructed to capture the relative importance of the two categories. This variable is

DED14	The ratio of the number of continuing firms that scrapped plant over the total number of firms to scrap plant. (N14/N14 + N34)

The results of using this dependent variable with the same set of regressors are reported in Table 20.

The regression coefficients listed in Table 20 confirm the differences inferred from the previously reported regressions using N14 and N34 as the dependent variable. There are relatively more plants scrapped by continuing firms where economies at the plant level (ES) and the firm level (RCR) exist. The only growth variable that is even weakly significant is exports (GX). The coefficient on these growth variables represents the net effect of the "rationalization" process that should lead to more exit and the "well-being" effect that should lead to less exit. That the export variable is positive indicates that only for this growth variable is the rationalization

TABLE 20

THE RELATIVE SIGNIFICANCE OF PLANT SCRAPPING BY CONTINUING FIRMS TO TOTAL SCRAPPINGS

DED14

	Coeff.	Sign.
Growth Variables		
GX	0.002	0.18
GM		
GT		
Profitability Variables		
PCOMB	- 0.04	0.62
RG6	- 0.05	0.08
CVAR	- 0.04	0.14
Barriers to Entry		
ES	1.03	0.00
CDR		
RCR	0.44	0.00
RD		
AD		
Other		
R^2	.17	
F (6,132)	5.96	0.00

motive relatively more important for continuing firms. Finally, the profit variable RG6 has a significantly negative coefficient, even though it was significant in neither N34 or N14. In conclusion, the variable that measures the likelihood that scrapping of plant occurs without the exit of the firm is positively related to plant and firm economies, growth from exports, negatively to profit growth over the decade.

In order to investigate further the difference in the two exit categories, exit was redefined not in terms of absolute or relative numbers but as the proportion of 1970 industry sales that were accounted for by plants that were scrapped. The two dependent variables used were

SH34	The value of sales of all firms in existence in 1970 that exited via scrapping plant by 1979 divided by the total value of sales of all firms in 1970.
SH14	The value of sales of plants that existed in 1970 but that were scrapped by firms that continued in the industry throughout the decade divided by the total value of sales of all firms in 1970.

The results are reported in Table 21.

The separate growth variables show significance only in the firm exit equation (SH34) where export growth has a significantly negative effect. In the case of N34C only import growth was significantly related. However, contrary to earlier results for N14 the separate growth variables GM and GX do not significantly affect SH14.

Contrary to the case where numbers of exiting firms were used, in this case barriers to exit existed both at the firm level and at

TABLE 21

THE RELATIVE SHARE OF EXITING FIRMS AND OF CONTINUING FIRMS SCRAPPING PLANT

	SH34		SH14	
	Coeff.	Sign.	Coeff.	Sign.
Mean Constant	356.6	0.00	37.2	0.00
Growth Variables				
GX	-2.70	0.03		
GM				
GT				
Profitability Variables				
PCOMB	21.1	0.67	-41.4	0.17
RG6				
CVAR				
Barriers to Entry				
ES	-1154.8	0.00	-207.8	0.02
CDR	12.1	0.66	6.6	0.67
RCR	-376.8	0.00		
RD	-73.9	0.25		
Other				
VAR	5.0	0.00		
REG			15.7	0.21
FO	-122.5	0.00	45.6	0.02
CA	-10.8	0.47	-2.34	0.78
R^2	.51		.05	
F	17.49	0.00	2.3	0.04
(degrees of freedom)	(9,126)		(6,134)	

the plant level. For SH34, the coefficients on plant economies (ES) and residual concentration (RCR) are negative and both are highly significant. For SH14, only plant scale is negative and significant.

Profitability as measured by PCOMB does not affect the share of exiting firms, as was the case for N34; it has a weakly significant negative effect on SH14 as it did on N14. Instead of the profit rate variables, a variable (VAR) that was meant to capture well-being had a significant positive effect on SH34 but did not affect N34.

Finally, differences in the effect of foreign ownership are exhibited for the two share variables. Foreign ownership has a significantly negative effect on the share of exiting firms (N34) but a significantly positive effect on the share of exiting plants of continuing firms (N14). This may be the result of either the ability of foreign firms to close plants as manufacturing entities but maintain them as distribution centres for imports brought in from the parent firm, or because rationalization of product lines is easier for industries dominated by foreign firms.

M. A COMPARISON OF THE ENTRY AND EXIT PROCESS

Dividing the entry and exit process into various components has revealed both similarities and differences that the use of more aggregate data could not have. Several comparisons can be made between the entry and exit process in general; the alternate methods of entry and exit; and the response of foreign and domestic firms within each category.

(i) Rationalization

The first significant difference between the entry and exit process lies in the impact that the existing number of firms as of 1970 (NC and NF) has on each. Table 22 summarizes the coefficients attached to NC and NF in the various new plant entry and exit categories for domestic and foreign firms.

When measured in terms of absolute numbers of firms the largest proportion of entry and exit occurs in the category of domestically-controlled firms that build new plants or scrap old plant (see Table 3). For these domestic firms, the coefficient on existing number of domestic firms in 1970 (NC) is much smaller for entry (N23C) as opposed to exit (N34C). The coefficient on NC in the entry equation can be interpreted as the entry replacement process. The coefficient on NC in the exit equation will reflect this replacement process as well as the rationalization that occurs due to exits that are related to industry size as measured by NC. Since the coefficient on NC is much larger in the exit equation, there is a considerable amount of exit that is of the latter variety in the domestic sector.

In contrast, the coefficient on NC for domestic continuing firms that build plant (N13C) is greater than for those that scrap plant (N14C). This suggests there was little rationalization of existing domestic firms that was related to total number of firms.

The coefficient of NF in the foreign new firm entry equation (N23F) is somewhat less than on NF in the exit equation (N34F) but the difference is not as great as for domestic entrants (N23C) and exits (N34C). The coefficient on NF in the foreign continuing firm new plant creation (N13F) and plant death (N14F) equations are almost

TABLE 22

A COMPARISON OF THE RESPONSE OF ENTRY AND EXIT TO EXISTING NUMBER OF FIRMS

(coefficients and standard errors)

	NC	NF
Domestic		
N23C	.170 (.015)	.326 (.074)
N34C	.401 (.016)	
Foreign		
N23F	.004 (.002)	.166 (.012)
N34F		.238 (.015)
Domestic		
N13C	.018 (.002)	.040 (.011)
N14C	.009 (.003)	
Foreign		
N13F	.0011 (.0017)	.073 (.009)
N14F		.080 (.010)

Notes: NC - number of domestically controlled existing firms as of 1970

NF - number of foreign controlled existing firms as of 1970 the same. This suggests there was little rationalization by continuing foreign firms via the entry and the exit process.

There is, however, an interesting pattern of rationalization that emerges from these results. The net effect of entry and exit can be measured by comparing total entry across both foreign and domestic categories. For instance, examination of column 2 of Table 22 shows that the net effect of NF on number of firms is positive since the domestic firm (N23C) and the foreign firm (N23F) entry response is greater than the exit response of N34F. In contrast, where there are domestic firms (NC) the net response is negative. Since growth and therefore size of the industry are held constant in other included variables, this implies that industries with low percentage of foreign ownership should have experienced a higher degree of rationalization than those with high foreign ownership because the turnover process was leading to a greater number of firms in the latter case. This is the result of two factors. First, foreign firm net exit was not as great as Canadian; secondly domestic firms entered at a high rate in industries where foreign firms were located but the opposite did not occur.

The same phenomenon can also be seen in the continuing firm categories. Here too Canadian firms built more new plants where the number of foreign firms was high and this would have led to number of plants increasing where foreign ownership was high since the foreign firm plant creation and death process that was related to number of foreign firms just balanced one another. In conclusion, the pattern of decreasing foreign ownership, described earlier in Tables 7 and 8, was the result of the expansion of the domestic firms in sectors where foreign firms predominated. Foreign firm births and deaths more or less balanced one another in these sectors but domestic firms expanded.

(ii) Growth Opportunities

The second major difference that extends both across categories of entry/exit and across types of firms lies in the coefficients attached to the growth variable. Table 23 summarizes the coefficients attached to each of the growth variables. In this table, the coefficient on exports is the net effect derived from GX and GT. Only new or exiting firms that are domestically controlled (N23C, N34C) have significant coefficients of the expected sign in most categories. As a result, if net entry (gross entry minus gross exits) is used as the dependent variable only in this category would the growth variables have the expected signs.

In the domestic controlled, continuing firm category, export growth has a negative effect on number of plants. While export growth is related positively to entry, it has a positive effect on exit as well. Examination of the coefficients on GM indicate import growth has a positive effect on number of firms because it negatively affects exits. The same general tendency is true for the continuing foreign controlled category as Table 23 demonstrates. Concentration upon net entry (gross entry minus gross exits) would fail to catch these offsetting effects.

The growth coefficients in the entry and exit equations can be used to deduce the net effect on number of firms of a balanced increase in trade resulting from trade liberalization. The net effect

TABLE 23

COMPARISON OF THE EFFECTS OF GROWTH ON ENTRY AND EXIT

	New and Exiting Domestic Firms			New and Exiting Foreign Firms		
	Entry N23C	Exit N34C	Net	Entry N23F	Exit N34F	Net
EXPORTS	0.60*	-0.46*	1.06	0.036	-0.008	0.044
IMPORTS	0.11	-0.44*	0.55	0.027	-0.046*	0.073
DOMESTIC SALES	1.00*	-0.27*	1.27	0.018	-0.003	0.021
NET EFFECT			0.34			0.096
EXCESS	0.72*	-0.35*	1.07	0.025*	-0.017*	0.042

	Continuing Domestic Firms			Continuing Foreign Firms		
	Entry N13C	Exit N14C	Net	Entry N13F	Exit N14F	Net
EXPORTS	0.081*	0.107*	-0.026	0.047*	0.042*	0.005
IMPORTS	-0.013	-0.118	0.005	-0.025	-0.032*	0.007
DOMESTIC SALES	0.031*	-0.043*	0.074	0.014	-0.007	0.021
NET EFFECT			-0.095			-0.009
EXCESS	0.022*	-0.056*	0.078	0.006	-0.018*	0.024

Notes: 1) The net figure which is derived from the figures in the entry and exit columns and is rounded to two decimal places.

2) The asterisk represents significance at the 10 per cent level.

can be calculated by taking the coefficient on exports adding to it the coefficient on imports and substracting the coefficient on domestic sales since the latter will be reduced by imports. In the new or dying domestic firm category (N23C, N34C), there will be a net increase. The net effect on the number of foreign firms is also positive but smaller than for domestic firms. For continuing domestic controlled firms, the number of firms creating plant is less than the number scrapping plant. In the continuing foreign firm category, the net effect is also negative. But it is the new and exiting firms that dominate the plant creation and scrapping process. Thus the results depicted in Table 23 show trade liberalization increases the number of domestic firms relative to the number of foreign firms.

Alternately, it could be argued that the balanced trade effect should be calculated as the net effect of GX less GT. For every increase in exports, domestic sales must decrease by the same amount because of increased imports. Imports affect entry only in sofar as they reduce domestic production and they should have no separate effect. There may be some validity to this since, at least in the entry equations, imports are not significant. And the fact that they are significant, with an unexpected sign, in the exit equation may be that they are a proxy for negative growth rates -- which, it has been demonstrated, leads to less not more exits.

If only the net effect of GT and GX is calculated, then domestic firms do decline relative to foreign firms. This is the opposite conclusion to that drawn above. The difference between the two is the result of the perverse behaviour of the exit response to imports. It is possible that this failure to adjust is the result of government assistance policies. In this case, the conclusion would be that balanced increases in trade should result in fewer firms of larger average size but this is not presently the case because of industrial policies that are being followed.

Similar conclusions with respect to continuing firms net plant creation can be drawn. If the perverse signs on the exit equations are ignored and only the significant coefficients in the entry equation are used, very little difference would exist between the foreign and domestic categories. It is the perverse signs in the exit category that increase the number of plants of domestic continuing firms relative to foreign continuing firms. All of this suggests that industrial strategy has significantly slowed the adaptation process.

(iii) Changes in Market Size as Opposed to Minimum Efficient Sized Plant

The growth variable that was utilized in this study represented the amount of new room available for new firms that entered with an efficient sized plant. This variable was broken into two components. The first measured the extent to which new room was created when markets expanded (GT). The second measured the extent to which less room was available because the proxy for minimum efficient scale was increasing (EXCESS). The results depicted in Table 23 reveal the extent to which entry and exit responded differently to these two different growth opportunities.

Generally, the coefficients were similar for each of the entry and exit categories, thereby suggesting little differences in the response to the two variables. However, the coefficient of EXCESS for N23C was substantially less than that for GT for the N23C category.

In a limited sense, this suggests that domestic entry was not contributing to the rationalization process. In addition, for all the foreign categories except N13F, the coefficient on EXCESS was much more significant than for GT. Thus foreign entry and exit was much more closely related to the rationalization process than it was to expansion in the total sales (both domestic and export). Finally, of the four merger categories (N22C, N22F, N12C, and N12F) only domestic horizontal mergers (N12C) is related to EXCESS and then negatively. Thus not only are there more such mergers where growth (GT) is lower, but there are more such mergers where average plant size is increasing. Horizontal mergers, therefore, respond in a way that would reinforce the movement to larger average plant size.

(iv) Entry Barriers

An examination of the gross entry and exit equations reveals the effect of entry barriers that would otherwise have been missed if only net entry had been used as the dependent variable. Table 24 summarizes the entry barrier coefficients. For domestically controlled firms creating or scrapping plant, plant scale (ES) and residual concentration (RCR) are negatively related to both entry and exit. Residual concentration is a more significant barrier for both entry and exit than plant scale but even the former is significant at only the 21 per cent level. The advertising interaction term (NTD1) is significantly negative in both entry and exit equations. Finally, while the research and development variable is significantly negative in the entry equation, it is significantly positive in the exit equation.

TABLE 24

A COMPARISON OF ENTRY BARRIER EFFECTS

	ES	RCR	NTD1	NTD2
N23C	-29.60 (.28)	-8.10 (.22)	-0.035 (.00)	-0.203 (.00)
N34C	-22.28 (.43)	-8.72 (.21)	-0.087 (.00)	0.226 (.00)
N23F	4.59 (.29)	1.32 (.22)	-0.004 (.10)	-0.005 (.11)
N34F	-3.18 (.45)	-2.03 (.06)	-0.096 (.00)	0.005 (.77)
N13C	1.04 (.81)	1.46 (.17)	-0.001 (.79)	-0.018 (.00)
N14C	-0.87 (.84)	1.07 (.34)	0.009 (.00)	0.0001(.97)
N13F	2.08 (.53)	1.49 (.07)	0.0001(.95)	-0.001 (.59)
N14F	3.09 (.30)	1.91 (.01)	0.028 (.09)	-0.004 (.72)

For foreign controlled firms, the standard entry barrier variables do not have the same significant effect in both the entry and exit equations. Indeed plant scale (ES) and residual concentration (RCR) are positive in N23F but negative in N34F. Thus these "barrier" variables would actually have increased the number of foreign firms over time. In this respect, then the barrier variables might be said to have very different effects on the net number of domestic as opposed to foreign firms. It is true, however, that the advertising interaction term is negative in both equations.

Turning to the continuing firm equations, little evidence is found of barrier effects that are of equal importance. Residual concentration positively affects domestic continuing firm creation of new plant (N13C) and scrapping of new plant (N14C) but is only weakly significant in the former. The foreign continuing firm categories (N13F, N14F) do not have any of the variables (ES, RCR, NTD1) with similar negative coefficients. NTD2 is negative for N13F and N14F but not significant in either. In this sense, the scale and residual concentration do not interfere with the adjustment process.

What then can be said about the way market imperfections affect the adjustment process? The entry and exit models developed earlier essentially allow for three effects - through interaction effects on growth, through the adjustment process relating to profitability, and on turnover rates relating to number of firms.

In the first case, none of the growth interaction terms turned out to be significant in the fully specified model. Thus the response of entry and exit to growth did not depend on 1) the extent of scale barriers at the plant level 2) the degree of tariff protection afforded the industry or 3) the advertising intensity or 4) the research intensity. In this sense, adaptation to changes occasioned by trade liberalization is not impeded by market imperfections.

The second source of market imperfections stems from the plant scale and the residual concentration variables. These are the variables that determine the height of the entry blockading profit level. The higher is this profit level, the higher (lower) must prices rise (fall) before entry (exit) is generated and adaptation occurs. Here there is only weak evidence of market imperfection. Entry is not significantly affected by plant scale. Exit of entire foreign firms is, however, significantly reduced by residual concentration (RCR). This accords with the view that exit may be hampered by multi-unit operations because of the control loss in such entities (Caves and Porter [1976]).

Some care must be exercised in interpreting these coefficients. Even if they were significant, there is an alternate interpretation that can be placed on them that would not imply the existence of any market imperfections. In particular, rather than capturing the entry blockading price concept, they may be capturing several characteristics of the size distribution of firms. For a given number of firms (N), when ES or RCR is high, firm size distribution could have a larger variance and/or be skewed towards larger firms. It could be argued that fewer firms would enter and exit such markets but this does not imply the adaptation process is imperfect.

Nevertheless, the relative size of the coefficients of the entry barrier variables in the entry and exit equations do reveal information about the underlying dynamics of the turnover process.

The stochastic growth literature (Simon and Bonini [1958]) stresses the inexorable march towards concentration during the life cycle of an industry. Marcus [1969] argued that there are offsetting effects which eventually slow down the rate at which large firms grow. Still others would argue that the market system is sufficiently dynamic or large firms sufficiently rational (Caves [1983]) that concentration may decline over time.

The relative size of the coefficients on ES and RCR indicates whether over time net additions are being made to firms (N23 and N34). For the domestic segment, there is little difference thereby suggesting no dramatic changes - at least across the 141 industries used here. In contrast, for foreign firms, ES and RCR are both positive for entry but negative for exits. The ultimate effect of ES and RCR is to increase the number of foreign firms. This suggests the degree of foreign ownership has not yet reached an equilibrium position. For the domestic continuing firm category, there is very weak evidence to suggest that there is more plant creation than plant scrapping where barriers are high. The opposite is the case for foreign firms. Foreign firms thus may be characterized as rationalizing more in concentrated industries than domestic firms.

This same pattern of the relative effect of the entry barrier variable can be observed in the share equations reported in Tables 15 and 21. Both ES and RCR negatively affect SH23 but they have an even greater negative effect on SH34. While there may be less entry and exit in high barrier industries, the share of the group that is entering more than offsets that which left thereby suggesting that the continuing group is losing its dominance. The share equations show RD has the opposite effect to ES and RCR. It decreases exit by less than entry, thereby ultimately increasing the share of continuing firms.

Comparing the coefficients on foreign ownership (FO) in the entry and exit share equations reveals an interesting dichotomy. The coefficient on SH34 is negative and larger in absolute size than the negative coefficient on SH23. Foreign ownership leads to less entry and exit, but relatively more entry than exit. In this sense, competition in foreign dominated industries is beneficially affected. In contrast, the coefficient on foreign ownership in SH14 is positive and larger than SH13. Thus continuing firms' plants were becoming larger in industries with high foreign ownership. This implies the rationalization process is greater in foreign dominated industries and that this is being accompanied by an expansion of new firms relative to exiting firms.

The third source of market imperfections is found in the advertising and research and development interaction terms that modify the turnover rates. Both of these are often significant. Advertising is negative and significant in both the domestic and foreign equations for both N23 and N34. However, a closer examination of Table 24 indicates the coefficient in the exit equation is generally larger in absolute value than in the entry equation. Therefore, the effect of advertising is to increase entry relative to exit, a situation which ultimately increases the number of firms. In contrast, research and development leads to less entry and more exit in both domestic and foreign categories for N23 and N34 thereby contributing to greater concentration.

The NTD1 and NTD2 variables have a different interpretation in the continuing firm equations. Here they give the relative tendency of firms to close and open plants. The results show advertising leads to less plant opening and/or more plant closing for both domestic and foreign continuing firms and ceteris paribus to larger scale. Research and development reduces domestic continuing firm plant openings without affecting closings thereby having the same effect. In summary, both these "entry barriers" appear to be associated with movement towards more optimal plant size on the part of continuing firms. Imperfections, therefore, in the market do not appear from the usual barrier sources - except perhaps from the effect of research and development upon the net number of new firms and the ultimate impact on competition.

(v) Differences in Domestic and Foreign Firm Response to Entry Barriers and Profitability

Earlier work using net entrants (Gorecki [1975]) suggested that foreign firms were more responsive to profitability variables than domestic firms but were not responsive to entry barriers. The results reported here require a change in this conclusion. The differences for N23C and N23F are not significant. Profitability affects neither. Plant economies of scale (ES) has a negative coefficient for N23C and a positive one for N23F but neither is significant. The advertising and research interaction terms (NTD1 and NTD2) negatively affect both entry categories. But they are more significant for the domestic category.

In the exit categories (N34C and N34F), there are also more similarities than differences. The major difference lies in NTD2 which is significant for N34C but not for N34F. Research and development intensity affects the exit rate of domestic firms but not foreign firms. The latter may have a comparative advantage in research. If the continuing firm categories are compared, roughly similar results hold. Research and development NTD2 affects the domestic plant creation category more significantly than the foreign categories. Residual concentration negatively affects foreign continuing firm scrapping, but not domestic continuing firms.

The results reported here also do not show foreign firms to be more responsive to profit or opportunities variables. Neither domestic firm entry (N23C) nor (N34C) is sensitive to small firm well-being. Neither foreign firm entry and exit (N23F) nor exit (N34F) is responsive to this variable. Nor was it responsive to other definitions of profitability such as average gross rate of return; or large firm rate of return. In the continuing firm category, new plant creation for both is responsive to small firm well being.

The clearest distinction between domestic and foreign firms, which the level of disaggregation used by this analysis reveals, is the difference in the response of each group to growth opportunities. While Canadian new firms (N23C) respond positively to exports and domestic growth, foreign entering firms (N23F) do not respond to these sources of growth in a significant fashion. This difference also exists for continuing firms creating plant (N13) or scrapping plant (N14). Continuing domestic firms creating and scrapping plant (N13C, N14C) respond more significantly to export and domestic growth than do foreign firms (N13F, N14F).

(vi) Plant Creation and Scrapping by New as Opposed to Existing Firms

The level of disaggregation presented in this analysis has indicated an important similarity that would have been missed if only net entry had been examined. The entry section has demonstrated that new plant creation - whether by new firms or existing firms - responds quite generally in a similar fashion. Entry by new plant creation should be treated as part of the general plant creation process. In contrast, exit via plant scrapping and plant deaths by continuing firms differ substantially. This result substantiates the need to place as much care on the modelling of the exit as the entry process.

CONCLUSION

Two major changes have taken place in the 1970s that have required adaptation by the Canadian manufacturing sector. There has been an increase in the exposure of the manufacturing sector to international trade. Both exports and imports, when measured as a percentage of domestic trade, have increased by between 20 and 25 per cent. At the same time, the inexorable pressures leading to larger scale plant have continued. On average, Canadian plant size, measured in constant 1970 dollar sales, increased by about 33 per cent between 1970 by 1979.

This paper demonstrates that Canadian firms were able to take advantage of the increased opportunities offered by trade liberalization. Entry and exit by Canadian firms was a significant function of the international growth opportunities. On the other hand, foreign entry and exit bore less relationship to these growth opportunities. The motives of foreign entry and exit cannot be found in a standard set of incentive variables - either the profitability variables or the growth incentive variables. Thus adaptation to the growth opportunities via firm entry or exit was borne primarily by the domestic sector. However, both sectors adapted to changes in average plant scale.

In contrast to the external adaptation process, adaptation to growth opportunities by continuing firms that created plant was somewhat more similar for domestic and foreign firms. In creating new plant, both domestic and foreign firms responded to export growth; moreover, foreign firms were, if anything, more affected by import growth than Canadian. Internal adaptation, in the way of plant scrapping by continuing firms, exhibited some aberrant tendencies. Export and import growth had the wrong signs. Examination of the cause of this aberration revealed that this stemmed from a perverse relationship between the exit rate and negative growth. The larger the negative growth rate the less likely were both domestic and foreign plant scrappings. This relationship was particularly significant for domestic continuing firms. Thus it is the scrapping process of continuing firms where imperfections primarily existed.

This paper also indicates that the 1970s were characterized by substantial adaptation by domestic firms in a different sense. The results show that the "natural tendency" of a balanced change in trade may have been to decrease the number of Canadian firms via the effect of import and export growth on firm entry and exit. But equally important, a second aspect of the rationalization process took place that was not directly related to trade. The exit response of Canadian firms to number of Canadian firms (NC) was greater than the entry response. A similar tendency existed for foreign firms, however it was not as great. Given the smaller average size of Canadian firms, the scope for exploiting economies would have been greater for the domestic as opposed to the foreign sector.

While rationalization was occurring within the domestic sector, domestic firms were also expanding into areas previously dominated by foreign firms. Domestic firms that entered by building plant and domestic continuing firms that built plant did so at a rate that was substantially higher where foreign firms existed than where domestic firms were located. Moreover, the domestic entry response rate to foreign firms was greater than the foreign.

In summary, the domestic sector in manufacturing responded to the increased opportunities for trade provided by the ongoing process of tariff revisions, underwent a rationalization process that should have bolstered its competitive position, and entered into sectors that foreign firms had previously dominated.

APPENDIX A

The Relative Size of New Firms Creating New Plant (N23) to Continuing Firms (N15+N13+N12)

The relative size variable was regressed on four sets of variables. The first set consisted of industry structure variables such as concentration (CR4), the cost disadvantage ratio (CDR), advertising intensity (AD), research and development intensity (RD), a regionalization dummy (REG), and foreign ownership (FO). The second set consisted of variables intended to catch the trade effects on average size-imports (M), comparative advantage (CA), effective rates of protection (EFF), and nominal tariff rates (NRP). The third category includes one variable -- overall market size (SALES). Finally terms were entered to capture the interaction between concentration and tariffs. The first is a dummy variable for high tariff, high concentration industries (HNTRHCR9). The second is SALES where HNTRHCR9 = 1.

Table A-1 contains the results. Concentration is the only variable whose significance is less than 10 per cent. Very weak evidence suggests foreign ownership leads to small entrants relative to existing firms and comparative advantage to large entrants. The significance of these two coefficients is .17 and .15 per cent respectively. The interaction variables HNTRHCR9 and EASTN79 are significant at only the .22 and .17 per cent. Their coefficients suggest entry has been breaking down the old inefficiencies that tariffs had created. For in highly concentrated, high tariff industries the relative size of entrants is larger than elsewhere over this period. In summary, only concentration has any significant effect. It must therefore be concluded that larger average firm size that originated from entrants is not amenable to explanation to the same extent that entry is.

TABLE A-1

Regression Results

Variable	Coefficient	Significance
HNTRHCR9	0.386	0.22
FO	-0.330	0.17
CDR	-0.178	0.38
EFF	0.025	0.88
CA	-0.007	0.95
AD	-1.059	0.77
RD	-0.451	0.21
REG	-0.045	0.75
SALES	-0.002	0.36
CVAR	0.058	0.76
NRP	-0.627	0.41
M	0.482	0.15
CR4	-0.706	0.07
EASTN	-0.027	0.18
R^2	.16	
R^2	.04	
F(14,98)	1.33	.2013

Variable List:

HNTRHCR9 - a dummy variable for high nominal tariff, high concentration

FO - foreign ownership

CDR - ratio of value added per worker small plants to large plants

EFF - effective rate of protection

CA - comparative advantage

AD - advertising for consumer good industries

RD - research development personnel as a percentage of total employees

REG - regional industry dummy

SALES - sales for 1979 divided by the estimate of minimum efficient scale plant

NRP - nominal tariff rate

M - imports as a percentage of domestic disappearance

CR4 - the four firm concentration ratio

EASTN - SALES times HNTRHCR9 - or sales divided m.e.s. for high tariff; high concentration industries

Footnotes

1. Orr [1974] handles the problem of exit by setting his dependent variable equal to zero if his gross measure is negative.

2. Earlier work by Gorecki [1975, 1980] suggested substantial differences in the response of these two sets of firms both with respect to gross entry for Canadian manufacturing industries and diversification in the food manufacturing sector.

3. The country of control concept is largely that developed and used under the Canadian Corporations and Labour Unions Returns Act -- in general a corporation is considered to be foreign controlled if 50% or more of its voting rights are known to be held outside Canada or are held by one or more Canadian corporations that are themselves foreign controlled.

4. What is referred to as a birth does not necessarily mean the plant did not exist prior to 1970; nor does a plant death necessarily mean the plant was dismantled or left idle. In both cases, the plant could have been redeployed to or from another industry. Nevertheless, for the purposes of this paper, this is a genuine entry or exit.

5. The consolidated enterprise refers to all establishments across all industries under common ownership. It is not used in this study.

6. This means that new establishments that are subsequently merged are included as births but not as mergers. Similarly only divestitures of continuing plants are treated as divestitures.

7. Large plants are those which are required to report on "long forms". For a definition, see Statistics Canada, Concepts and Definitions of the Census of Manufactures, Catalogue #31-528.

8. Friedman [1955] pointed out that reported average cost curves will be the same even when real costs differ if cost advantages of the more efficient firm are capitalized.

9. In one sense, this is an aggregation problem stemming from the choice of 4-digit industries as being the relevant level used by this study.

10. This is perhaps a simplification of the shortcomings of previous models. Mansfield's formulation catches all non-profit related entry in the intercept, thereby essentially ignoring only explanations of it. Orr's formulation assumes that, when profits are zero, entry is proportional to industry sales -- thereby ignoring the difference in average firm sales across industries. Masson and Shannon set up their model so that only profits matter.

11. Using the ratio of entry to number of existing firms as the dependent variable is equivalent to postulating that the replacement coefficient is a function of all of these variables. While the ease of replacement may depend upon some of the variables traditionally used as entry barriers, it is difficult to rationalize the inclusion of profits in such a list.

12. For an oligopoly limit pricing that does consider the loyalty factor of customers, see Bhagwati [1970].

13. Growth may enter the set of vectors that determine the height of the entry limit price.

14. In effect B acts as a scaling function for the effect of profitability in equation 5.

15. Since growth might be interpreted as being in B, when the actual equation is run with G, the coefficient a_2 catches both effects of growth on entry. Masson and Shannon [1982] do not find the effect of growth as a variable in the barriers vector to be significant.

16. Minimum efficient scale was defined as the average size of plant for those plants accounting for the top fifty per cent of employment.

17. The gross rate of return used in both PCON and PDIF was calculated using average margins/sales ratios weighted by value added and multiplied by the industry sales/capital ratio.

18. Just as the removal of RCR from N23C does not make ES highly significant, the removal of ES from N23F does not make RCR highly significant.

19. In each case, the sales in a category as of 1979 is divided by sales as of 1979 to give the share variable.

20. When foreign ownership is removed, research becomes significant at the 3 percent level.

21. That these coefficients are insignificant does not mean these variables have no effect. It implies there is little additional information yielded by these variables beyond that contained in those others already included. Since number of firms (N) is already included amongst this set and this variable depends upon the entry barrier variables, our results simply indicate the entry barrier variables have no additional effect to that already included in N. Indeed, when the reduced form equation is estimated where SALES replaces N, the entry barrier variables become highly significant - as we would expect them to be.

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